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THE

DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S.

Observe, Compare, Reflect, Record.

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THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

THE VALUE OF TEMPERAMENTAL INDICATIONS IN THE CORRECT PROSTHESIS OF ENTIRE DENTURES.*

BY I. NORMAN BROOMELL, D.D.S., PHILADELPHIA, PA.

(Read before the Pennsylvania State Dental Society, July 8, 1896.)

THE study of the human temperaments is an ancient one, reference having been made to it by Hippocrates, who classified the temperaments into four grand divisions,—"sanguine," when blood was the predominating element; the "phlegmatic," if "phlegm" was in excess; or if the "yellow bile" existed in greatest quantity, the term "choleric" was used; and the remaining temperament, the "melancholic," was characterized by an excess of "black bile." Later on, when the bodily elements were more thoroughly understood, this classification became modified, rather more in name than in essential elements, however, and the terms sanguine, lymphatic, nervous, and bilious were adopted, covering the predominating influences created by the action of the four great organs,—the heart, the stomach, the brain, and the liver,—and this basal classification is generally accepted by writers at the present day. Before taking up the subject proper, I wish to refer to one or two thoughts which have suggested themselves:

First. Is man's physical condition due to his temperament, or is the temperament the result of his physical condition? In other words, is the human temperament a congenital state, or one that is acquired? If human beings are born with a physical constitution which dominates their life processes continuously, then we must consider the temperament as congenital. If, however, "all men are born equal," the elements only are present, at birth, from which the temperament shall be formed, and these will be developed in accordance with the environment. Not only will the

*Illustrated with lantern slides by the author.

surroundings exert a specific influence over the organization, but the food, the drink, and the occupation will all be instrumental in the coalition of the physical elements creating the temperament.

Second. At what age, or rather how early in life, may we be able to judge correctly the temperament of an individual? The general indications are certainly not fully developed and fixed before the subject has arrived at maturity. Outside the oral cavity changes are continually taking place which would mislead the most careful observer. The muscular development, which at the fifteenth year is observed to give a "well-rounded and graceful" form, may have changed at the twentieth year to "harsh and angular" outlines. The general contour at the former age may be "delicate and slight," but at the latter it may be "massive and square." The general movements may alter from quick and active to slow and deliberate. But while all these changes are taking place, there remains in the mouth most positive evidence of what the matured subject will be. The teeth, the form of the arch and dome, will at a very early age denote the true temperamental character of the individual.

The four basal temperaments, always more or less positive in their individual characteristics, will frequently give to the dentist who may comprehend them most valuable assistance in his efforts at restoring the features, assistance far more reliable than any information he might be able to elicit from the patient. These four primary types are present in a very small proportion of cases, however, but there will always be found some one special feature predominating which will characterize the individual as strongly inclined toward one or the other. If, as before stated, a thorough knowledge of what constitutes either the nervous, bilious, sanguineous, or lymphatic temperament be had, the dual or mixed characteristics will be sufficiently apparent to be more readily understood, and the assistance rendered to the operator will be as follows: A proper selection of the teeth, as to size, shap contour, color, overbite, cusp-formation, etc.; an idea of the conditions which should exist, or which should be reproduced, at the gingival margins, there being no stronger individuality existing in the oral cavity than that shown by these festoons of fibro-mucous membrane; also the nature of the tooth-occlusion as formerly existing, including the length of the overbite and the depth of the cusps, the length of the overbite generally corresponding to the depth of the cusps in the bicuspid teeth. Along with the general indications which serve to make up the individual are two of a local nature, most positive in their conclusions,—the dental arch, and the palatal dome or roof of the mouth.

In the bilious temperament (Fig. 1) the arch will be found presenting a broad front from cuspid to cuspid, with but little curve, then turning abruptly backward at the canine eminence. The dome is comparatively high and flat, extending from one alveolar process to the other, when it descends abruptly to the necks of the teeth.

The typical arch of the sanguine temperament (Fig. 2) is well

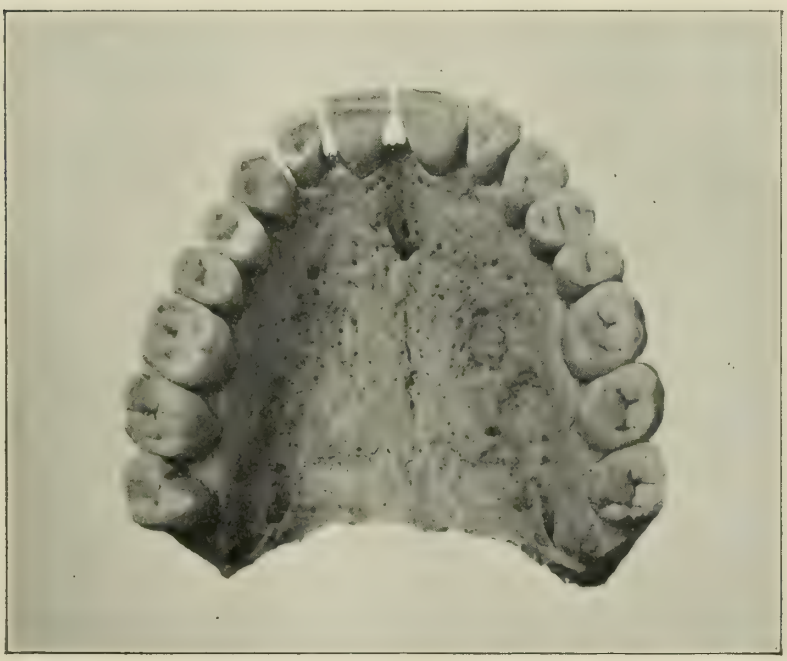
rounded anteriorly, the circle being continued backward to the region of the molars, where the line is broken. The dome in this type presents almost a perfect oval.

The lymphatic arch (Fig. 3) is gracefully rounded and well proportioned, while the hard palate is segmental in form.

FIG. 1.



FIG. 2.



In the nervous temperament (Fig. 4) the arch is Gothic in form, while the dome is high and semi-elliptical or parabolic in shape.

An unimportant fact in connection with the outlines of the upper half of the oral cavity is the similarity existing between the contour of the arch and the dome. In those cases where the arch

is found to be contracted the dome will also be more or less so; and when the arch is semicircular in formation, the circle thus described will be duplicated in the dome. That is to say, if a card be cut with a curve following the morsal edges of the front teeth, its curve will also represent the section outline of the deepest part of the vault.

FIG. 3.



FIG. 4.



The variations in the height and shape of the dome are not so much controlled by the osseous formation as might be supposed, but appear to be more particularly regulated by the alveoli and soft tissues. The examination of about one hundred crania, principally edentulous, failed to reveal a pronounced case of extreme

depth or shallowness in the roof, although in many cases the remaining teeth were decided in their shape and indicated one of the basal temperaments. It may be assumed, then, that the formation of the dome in the living subject, particularly as to its height, is largely due to an elongated or shortened depth of the alveoli and the necks or roots of the teeth themselves.

With the assistance of a few illustrations and a brief description

FIG. 5.



FIG. 6.



of each, reference will now be made to the individual characteristics to be found in the four basal temperaments.

In this individual (Fig. 5) is seen almost a typical example of the bilious temperament. In general form he is lacking in graceful curves, but in their stead are lines more angular; the build is square, the figure tall and massive. The muscles about the face and jaws are hard, tense, and fully developed. The cranial contour is square, with the facial angle almost a right angle. The eyes are generally above the average size, and they and the hair

are dark brown or black. The nose is prominent, and the lips rather full and dark.

The teeth of the bilious temperament (Fig. 6) are large, abounding in angles rather than curves, their length predominating over

Fig. 7.



Fig. 8.



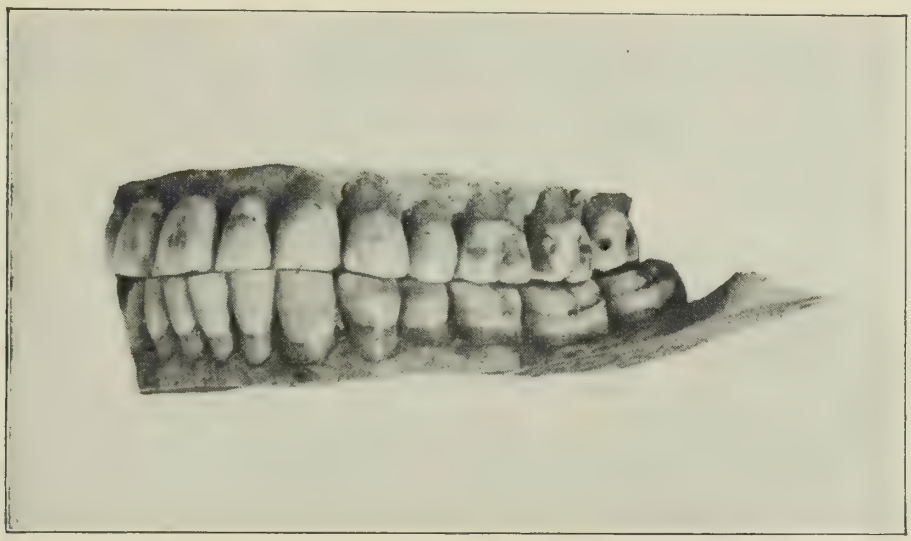
breadth. The labial surfaces of the incisors are marked by decided transverse ridges; the enamel surface is devoid of brilliancy, the surface presented being flat and dead. The cusps of the bicuspids and molars are not deep, but sufficiently so to form a

firm and well-locked occlusion. The masticating surfaces and cutting-edges are broad and square. The gingival borders are prominent and angular, with a superabundance of the membrane between adjoining teeth.

The nervous temperament (Fig. 7) is shown by a general delicacy and fineness of the body; the movements are quick and active, hair rather thin, muscles small, and the features finely cut. The cranium is large, to accommodate the brain, the dominating organ, with the frontal section of the face predominating. The lips are thin and well colored.

The teeth (Fig. 8) are delicate in form and outline, length predominating over breadth; cervix constricted, cusps sharp and deep, and consequently a long overbite; the occlusion is firm, positive, and penetrating. The gum-margins are finely shaped, frequently receding well upon the necks or roots of the teeth; enamel surface presents high lights.

FIG. 9.



The lymphatic temperament is manifest by a general roundness of form, slow and deliberate movement, soft and flabby tissue, and a sluggish circulation. The complexion is pale, the hair fine and light or sandy, and the lips rather rounding and full. The frontal section of the face is lacking, with the oral predominating.

The teeth of the lymphatic (Fig. 9) are not shapely, the breadth exceeding the length. The cusp formation is almost entirely lacking, and the occlusion consequently loose and wandering. The gingival borders are without definite form.

A face indicative of the sanguine temperament (Fig. 10). In it is seen a form of moderate fullness, light or brown hair, blue eyes, and a fair or ruddy complexion. The cranium is rounding and full, with the forehead high, predominating over both the nasal and oral divisions of the face. The nose is frequently above the average size, and the lips highly colored and full.

The teeth of this temperament (Fig. 11) are evenly proportioned, the cusps and outlines being rounded rather than angular.

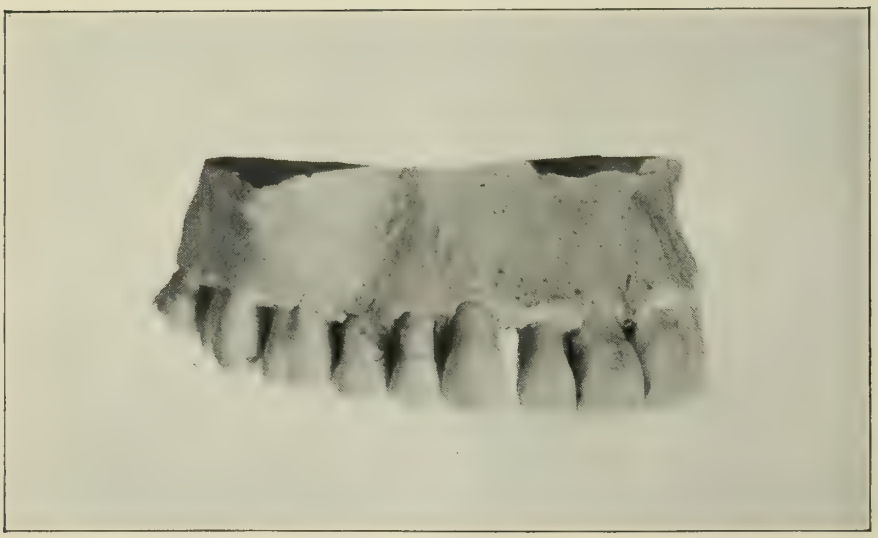
The occlusion is not firm, the jaw being inclined to extended lateral movement during mastication.

While the establishment and use of definite rules, either by imaginary lines or written regulations, will fall far short of accomplishing what is desired in the restoration of the facial expression in the edentulous subject, it may be admitted that general rules will in some cases assist in this somewhat difficult undertaking. The diversified conditions always existing in the human face, however, require for their restoration the use of lines other than those

FIG. 10.



FIG. 11.



which are straight, circular, or triangular, and these lines may be found in the temperamental indications which are always obvious, and sure to accompany the patient. In the edentulous subject we are minus one of the prime factors in making our temperamental diagnosis, but even with the loss of the teeth there remains evidence far more positive in its character than that produced by geometrical delineation.

The typical profile is generally described with a vertical line

drawn from the extreme top of the head to the lowest point of the chin, divided into four equal portions. "The first section marks the vertical distance between the top of the head and the roots of the hair; the second, that from the hair to the beginning of the nose; the third, the length from thence to the bottom of the nose; and the fourth, that from the bottom of the nose to the bottom of the chin."

To show the exactness of these measurements, let us take for comparison a face from nature, and in this we have what must be admitted to be a typical profile (Fig. 12). It will be noted that the lines previously referred to are applicable here, subdividing the face into four equal parts. But it must be remembered that this face is one endowed with more than the average amount of grace and harmony, and it is only in such a profile that these given lines or measurements are correct.

FIG. 12.



FIG. 13.



In this face (Fig. 13) the divisions are fairly well balanced, but the occipital portion is somewhat deficient.

In this lymphatic individual (Fig. 14) the occipital and frontal regions are about equal, the nasal division lacking, and the oral division, the gateway to the stomach, the center of activity in this type, predominating over all.

This head (Fig. 15) is well proportioned, with the exception of the occipital division, which is poorly developed. These few examples serve to show the variety of conditions existing in the human face, and suggest uncertainty, if an attempt be made to use these imaginary lines when practical results in prosthesis are designed and desired.

The same may be said of fixed lines or regulations within or about the oral cavity. Vital, not geometrical, laws should be consulted. Nature, although frequently providing what appears to be a very imperfect set of teeth, should be copied in reproducing

substitutes for these organs. The imperfections are more frequently caused by the ravages of caries than from any fault in the formation or the occlusion of the teeth. The value of viewing the teeth which at one time occupied positions in the mouth of the edentulous patient cannot be overestimated.

From the bicuspids alone (Fig. 16) and in particular, the most valuable information may be obtained. Each individual tooth in itself tells of the nature of the movements in the inferior maxilla during mastication, and these inherent movements, established in

FIG. 14.



FIG. 15.



FIG. 16.



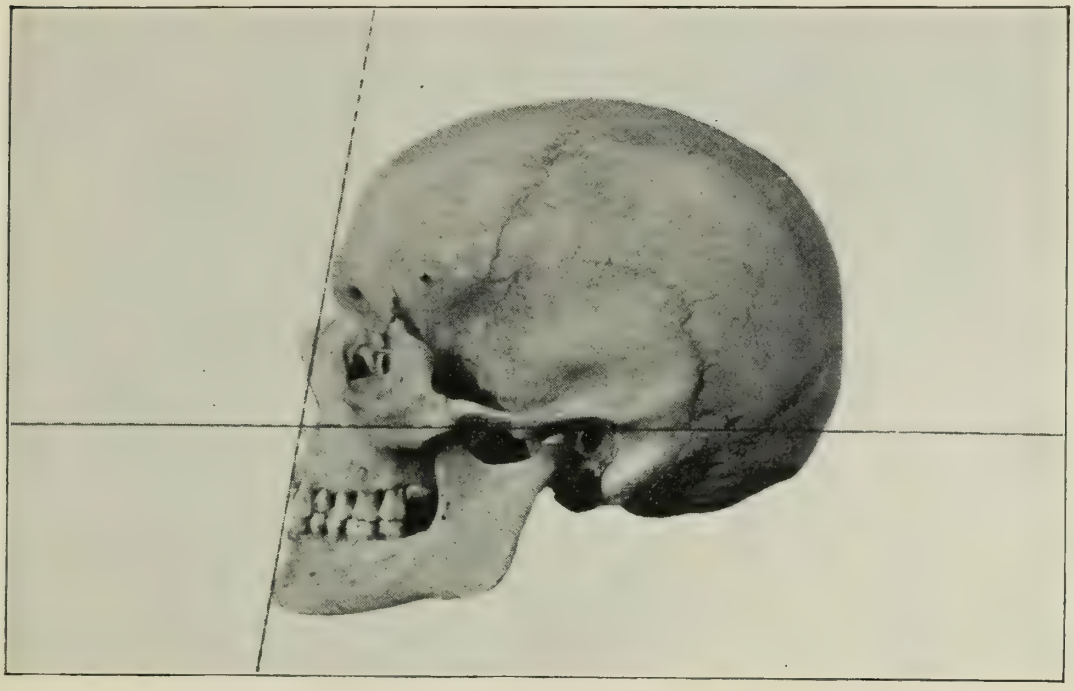
accordance with the formation of the natural teeth, should not be interfered with in prosthesis. When it is taken into consideration that no other living creature is in the possession of so varied a dental apparatus as that possessed by man, we must awaken to the necessity of a proper discrimination between the typal forms.

In some of the lower animals it is not uncommon to find teeth much more intricate in anatomical structure than those of man. The teeth of the leopard seal are extremely complicated in general

outline, yet the arrangement is uniform in the species. The same may be said of the dental organs in the dog and other animals. When there is a variation existing in the families just referred to, it is brought about by influences of environment. In the human race the variety in tooth-formation appears to be dependent neither upon climate, locality, or nationality, the diversity in form existing even when hereditary influences are favorable to similarity.

Let us next make a brief study of the cranial contour and facial angle, a little thought in this direction not being foreign to the subject. With a prominent development of the lower part of the face and jaws, a marked deficiency in the development of the forehead is usually noted, the nutritive factors overruling those controlled by the mental faculties.

Fig. 17.



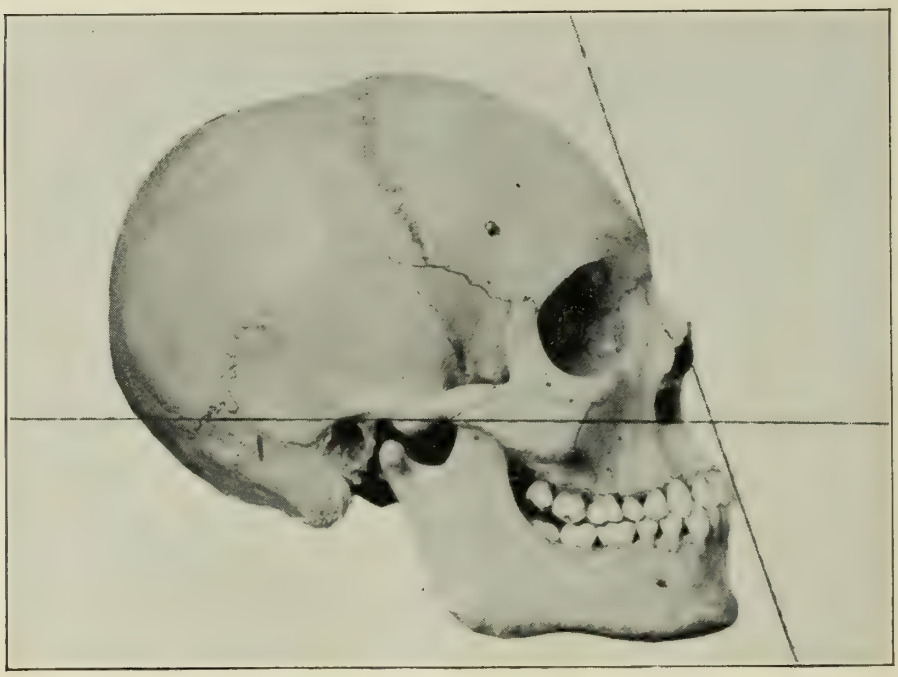
This condition is strongly manifest in the genus quadrumana, the skull of the baboon showing it in a marked degree.

In the smaller and more intelligent species of monkey the anterior cranial development is more marked, while the face and jaws begin to recede.

To properly study the cranial and facial contour, some fixed position must be established for the cranium before attempting to outline the profile. For this purpose the lines forming the facial angle may be used (Fig. 17). A fixed line representing the base of this angle may be drawn from the center of the glenoid fossa, passing forward through the anterior nasal spine, or base of the nose, and the angle is completed by a perpendicular line resting upon the labial surface of the superior incisor teeth, passing upward and touching the most prominent part of the forehead. In the Caucasian, or white race, this angle varies from 75° or 80° to almost a right angle.

In the negro and mixed races the second line may descend until the angle is but 65°, or even 60° (Fig. 18). It is claimed by some writers that the nearer this line approaches a right angle the greater the intelligence, while an advance beyond this point is accompanied by a decrease in the mental faculties. These statements appear to be without sufficient foundation, a falling back of the angle to about 80° being the average in the higher intellect. These lines describing the facial angle, and particularly the one forming its base, are of inestimable value when forming the occluding wax contour models. A proper observance of the position of the patient's head at this time,—that is, a leveling up by this imaginary basal line,—will give the operator positive information as to the tooth-line level, the position of the angles of the mouth, which have fallen from lack of support, and will also assist in the restoration of the normal fullness, etc.

Fig. 18.



The natural tooth-line level, without reference to the dip of the arch, is always horizontal to this basal line, and the contour wax models should be formed to correspond to this line. Not infrequently, when the posterior teeth have been missing for a number of years previous to the extraction of those anterior, the remaining alveolar ridge will impart no information about the tooth-line level, and this must be ascertained by reference to the basal line.

The angles of the mouth, when at rest, should correspond with the occluding surfaces of the bicuspids, and in the edentulous subject they may be located by reference to the occluding surfaces of the contour wax models, when formed in accordance with the above ideas.

The dip of the arch, which is well shown in the illustration (Fig. 19), will be found in those typal forms provided with the deep penetrating cusps and well-locked occlusion, this arrangement of

the teeth assisting to prevent rotation during mastication, and forming also a protection to the frail cutting-edges of the incisors common to this class.

The dip of the arch just referred to as existing in the nervous type gradually disappears in those cases when the occlusion is loose and wandering.

This may be demonstrated by reference to Figs. 6, 8, 9, and 11. In Fig. 9, which is lacking in cusp-formation, the tooth-line level is almost unbroken. In Fig. 11, with cusps of medium depth, the dip to the tooth line is perceptible; while in Fig. 8, with prominent cusps and the corresponding overbite, the dip of the arch becomes a prominent feature.

FIG. 19.



A very common error in the arrangement of the teeth in entire dentures is the inclination to widen the arch beyond that previously existing in the natural organs. This is particularly true in the lower denture, and is brought about by the desire to follow the line of the ridge as indicated upon the plaster cast. The illustration (Fig. 20) shows the lower jaw, with the teeth or alveoli remaining. It will be observed that the tooth-line does not follow the line of the body of the bone, but the perfect semicircular arch of the sanguine temperament is carried out by the teeth overhanging, as it were, the body of the bone by an extension of the alveoli inward.

With the loss of the teeth and of the alveoli, the original tooth line has been destroyed. If the artificial substitute were to be placed directly over the ridge, the line of the teeth and the shape of the arch might be incorrect.

While this condition of affairs exists in the sanguine and lymphatic temperaments, it is not often found in the narrow and contracted nervous arch (Fig. 21). Here the tooth-line is almost identical with the body of the bone, extending directly backward

in the direction of the condyles. Therefore, in the edentulous jaw of the nervous temperament, with the alveoli completely destroyed, the tooth-line as formerly existing in the mouth may be definitely established by reference to the ridge itself, while in those possessing a wide cranial base this reference would not be reliable. The cause of this variation in the tooth-line in the inferior maxilla is obvious. The cranial frame-work in the nervous type being light and contracted laterally, a greater uniformity exists between the upper and lower halves. With the increased width at the base of the sanguine and lymphatic skulls, the condyles are correspondingly widened, and the upper half of the skull not partaking of this

FIG. 20.



additional width serves in a measure to contract the upper dental arch, and the lower teeth, to properly occlude, are forced inward from the body of the bone.

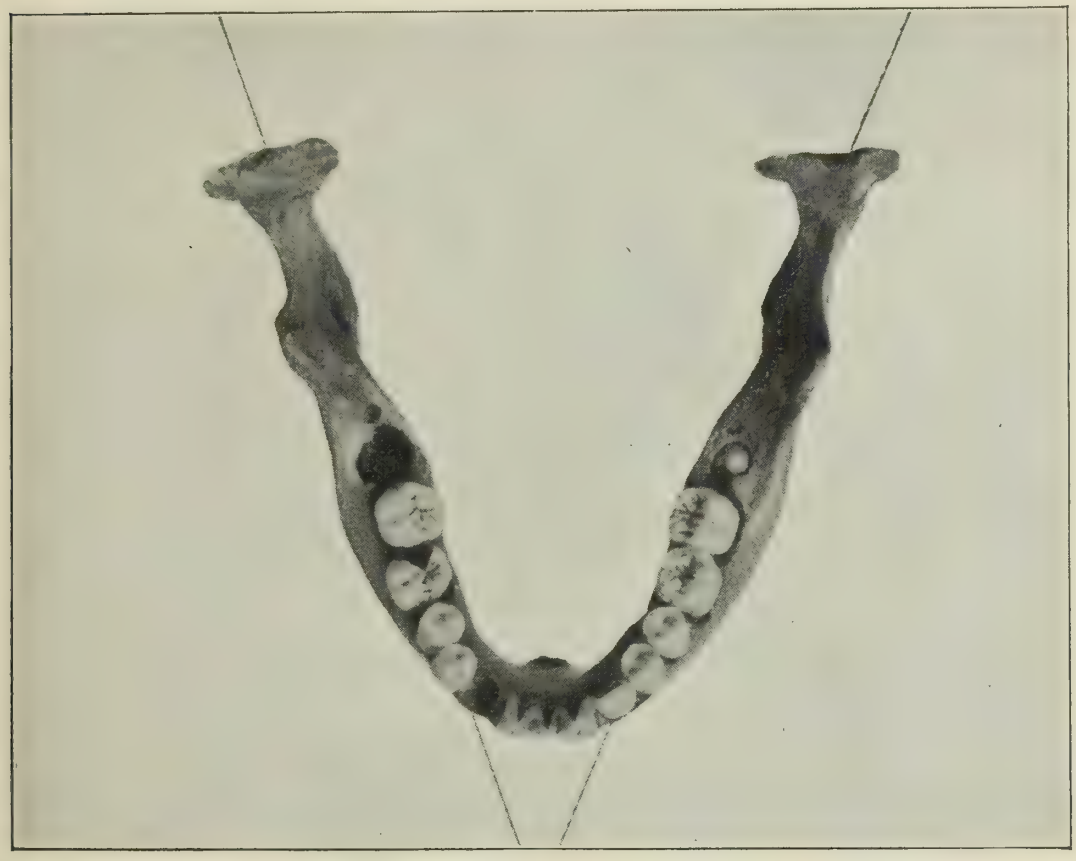
It is upon this point that exceptions might be taken to the theories of Dr. Bonwill, based upon measurements derived from the equilateral triangle. This will not be done, however, at this time, as he provides for a variation of half an inch in the sides of this equilateral triangle. I wish to add to this, however, that the equilateral form is most nearly approached in the lymphatic, sanguineous, and bilious types; while in the nervous subject the distal side of the triangle will be found shorter than the other sides.

The equilateral idea appears to be more fully carried out in the tooth-line itself, the distance from the cutting-edges of the incisors at the median line to the center of either the second or third molar

describing two sides of the triangle; while the distance from molar to molar forms the third side. (Fig. 22.)

If the selection and arrangement of the artificial teeth be made with reference to this equilateral triangle *within the mouth*, the result will be a greater success. In the edentulous case the proper selection of teeth becomes a matter of vital importance. It is rather surprising that Dr. Bonwill, in all his writings, fails to refer to this very essential primary step. The only rules given by him which could be used for this purpose are those by which he decides the width of the incisors, and to accept this as a fixed rule is to make them all of the same size. The method of forming the equilateral triangle within the mouth is both justifiable and reliable;

FIG. 21.



but even this is without definite value, unless the temperament of the patient be consulted. If teeth of lymphatic form, and of proper size, be placed upon the nervous ridge, the two lateral or buccal sides of the triangle would be lengthened, and the equilateral form could only be brought about by giving them the lymphatic contour, and this would, of course, result in too great fullness. The reverse result would appear if teeth of the nervous type were placed upon the lymphatic arch.

There is one member that is particularly concerned in the contour of the newly-constructed denture for the lower jaw,—that is the tongue. The development of this organ having been in accordance with its environments, it is natural to suppose that the tongue, when at rest, or when performing unconsciously or automatically its function during mastication, partakes of the shape of

its bony surroundings. Thus, in the sanguine mouth the margins of the tongue, when at rest, will form almost a perfect oval, while in the nervous mouth it will be more pointed anteriorly; and the same would be true of the other types. (Fig. 23.) What, then, would be the result if the tooth-line in the substitute did not correspond to that which existed in the natural organs? Take the

Fig. 22.



Fig. 23.



sanguine jaw, for instance, when the natural teeth overhang the inner margins of the body of the bone. Widen this arch in the substitute by placing the teeth upon the newly-formed ridge, as represented by the body of the bone, and the function of the tongue as an adjunct to mastication is practically lost. As before stated, the assistance rendered by the tongue being an involuntary

muscular action, its sweep would not now be sufficient to keep the food properly between the teeth without conscious effort. On the other hand, if the narrow and contracted substitute, suited only to

FIG. 24.

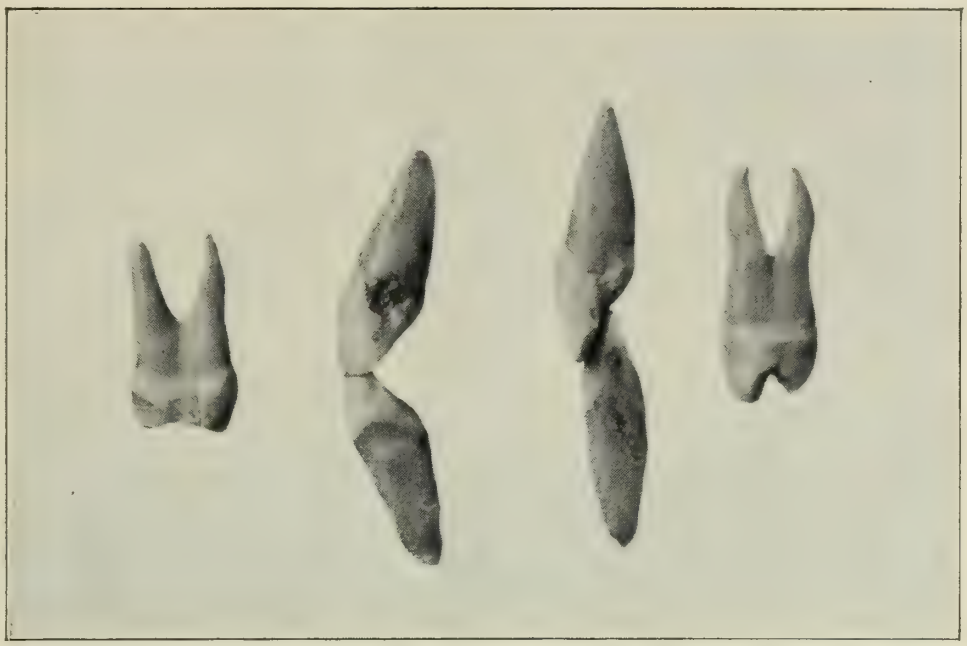


FIG. 25.



the nervous mouth, be placed in the sanguine or lymphatic patient, the tongue would be cramped, and both speech and mastication would be greatly impeded.

Probably there is no detail of greater importance than that of

the overbite in edentulous cases, this one feature of itself, if incorrect, consigning more dentures to the bureau drawers than all other errors combined. There is no method by which this may be determined except by the temperament, the length of the overbite establishing the nature and depth of the cusps in the bicuspids and molars. (Fig. 24.) The value of this detail may be presented as follows:

With the variations in the character of the occlusion there will be found a corresponding variation in the conditions existing in the temporo-maxillary articulations. (Fig. 25.) In the close, well-locked occlusion of the bilious subject the condyles and glenoid fossa are oblong and narrow in formation (see Fig. 27, *a*), resembling the ginglymus class.

Fig. 26.



In the nervous subject this individual peculiarity is even more marked, very little, if any, lateral motion existing, on account of the deep penetrating cusps and the heavy overbite. (Fig. 27, *b*.) In marked contrast to this condition, the condyle and glenoid fossa in the sanguine subject partake more of the nature of the ball-and-socket joint (Fig. 26), made so by the slight rotary motion common to this temperament, and the ball-and-socket idea is more nearly approached in the lymphatic; as in this case, the occlusion is extremely loose and wandering. Not only does the osseous structure in the joint partake of individual characteristics, but likewise the muscles and ligaments, whose function it is to operate the articulation. These are developed in accordance with the actions required of them, this action being dependent upon the conditions

existing in the oral cavity. Imagine, then, if you please, the affliction of the sanguine subject who has been furnished with dentures suited only to the nervous patient. Think of the strain that is forced upon the temporo-maxillary articulation every time the jaws are closed. Instead of the triturating or rotary movement which nature has endowed, and which has become firmly established before the loss of the natural teeth, we have this congenial action antagonized by the deep penetrating cusps of the nervous teeth locking the occlusion the instant the teeth have antagonized.

The reverse order would, at first thought, appear to be less burdensome to the unfortunate beings, the flat, cuspless teeth having a wider range of utility, serving equally well for either a wandering or a fixed occlusion. But the ill results in this case are from another cause,—that is, a lack of proper nourishment.

Just as all animals are provided with teeth adapted to their needs, so it is in man.

FIG. 27.



b *a*

Thus the teeth of the black bear *(Ursus Americanus)*, while closely antagonizing, are not indicative of ferocity, and have function common to carnivora in general, the presence of this special feature being unnecessary, as their prey is well torn to pieces by the powerful claws before reaching the mouth.

Also in the boa constrictor, with its long, keen teeth, entirely devoid of grinding surface, taking no active part in the digestive process, only serving to grasp and hold the prey until deglutition is well under way.

It may be safe to assume, then, that the human being of nervous temperament, with the deep penetrating cusp teeth and the fixed occlusion, will subsist best upon food most thoroughly masticated between such occluding surfaces, and will degenerate unless provided with artificial substitutes suitable to continue the mastication of their set food. The sanguine and lymphatic, to thrive, will desire, and should be provided with, that class of food most

thoroughly masticated under the triturating movement, and rapid decline may follow if the substitutes furnished are not adapted to the work which they will be called upon to perform.

In conclusion, it will be appropriate to add that the subject of this paper has been treated only in its broadest sense, no reference having been made to the mixed temperaments, which, of course, are largely in the majority. To treat the subject from this latter standpoint would entail greater study than the time given would permit.

If, as stated in the beginning, a knowledge of the four basal temperaments be attained, these fundamental principles may always be used to advantage.

Disinfectants and the Chemico-Metallic Method of Treating and Filling the Difficult Root-Canals of Semi-Devitalized Teeth.

BY GEORGE W WELD, D.D S , NEW YORK, N. Y.

(Read before the New York Odontological Society, October 20, 1895.)

A TRUE "disinfectant" is supposed to be an agent which is capable of destroying bacteria and neutralizing morbific effluvia. This definition is made in a restricted sense, for some writers include agents, embraced by the word "antiseptic," which are only capable of counteracting septic conditions of animal bodies. It has been said that the sun is one of the greatest of all disinfectants. Doubtless this is true. At the same time, we are led to believe that the spores of certain bacteria are not infrequently subject to summer's heat without being destroyed or losing their virulent properties. In the strict sense of the word, a disinfectant is an agent which destroys micro-organisms by chemical processes. We have considered a solution of the bichlorid of mercury a perfect disinfectant. Recent experiments, however, have shown that this chemical agent oftentimes produces a definite chemical reaction, resulting in the production of a third compound. Professor Abbott, of Philadelphia,* in his experiments found "that in the reaction that is seen to take place between the salts of mercury and albuminous bodies there results a third compound, which has neither the characteristics of mercury nor of albumen, but partakes of the peculiarities of both; it is a combination of albumen and mercury, known by the indefinite term 'albuminate of mercury.' In other words, the process is not a catalytic one, *i.e.*, occurring simply as a result of the presence of the disinfecting body which is not itself destroyed in its process of destruction, but is, as said, a definite chemical reaction which takes place within more or less fixed limits; in other words, with a given amount of the disinfectant employed, just so much work expressed in terms of disinfection can be accomplished."

*A. C. Abbott, M. D., "Principles of Bacteriology," Philadelphia, 1892, p. 49.

The experiments of Gippert are interesting in this connection. Gippert found that a reaction took place between a solution of bichlorid of mercury and the spores of anthrax bacillus, the result being the apparent destruction of the living properties of the spores. He demonstrated, however, that this did not imply the complete death of the protoplasm of the spores, for when, by use of the sulfid of ammonium, he precipitated the mercury,—that is, destroyed the combination of the spores and the mercury,—he found that the protoplasm of the spores returned to its original condition.

In this connection, Professor Abbott goes on to state that it is probable that all *inorganic* bodies combine with any or all of the protoplasmic bodies, and, furthermore, that the disinfection of excreta, sputum, or blood containing pathogenic organisms, by means of a solution of the bichlorid of mercury, is a procedure of very questionable success. Suppose we desire to disinfect the canal of a root of a tooth with a solution of bichlorid of mercury. What may be the result? Why, as soon as the energy of the solution, introduced on a piece of cotton, we will say, is exhausted, and after the third compound is formed by the union of the mercury and the albuminous compounds in the root, it becomes inert —at least, as far as its disinfectant properties are concerned; and a *renewal of the same is required* just as soon as this reaction which I have alluded to takes place, which may be, and probably is, within the space of one minute.

It may be said (1) that *heat* increases the energy, and is, in fact, the best of all disinfectants. (2) That whatever disinfectant is employed, the one which is powerful enough to destroy the life of a germ is also, in quantity and time, powerful enough to destroy human life. Indeed, certain spores of certain bacilli have been known to retain their life properties after having been subjected to the heat of boiling water for a period of fifteen minutes. It was this fact, in connection with a second and third boiling (or fractional sterilization), that upset Needham's theory of spontaneous generation.

It is perhaps difficult to draw a line and state positively what agent is an antiseptic but not a disinfectant; for although it is claimed that an antiseptic is not a disinfectant and a disinfectant is always an antiseptic, it is altogether probable that if pathogenic germs or spores were immersed for any great length of time in any of the so-called antiseptic solutions, the result would be their ultimate death.

By the word *sterilization*, in contradistinction to *disinfection*, we mean the destruction of bacteria by heat or mechanical means instead of a chemical process. There are two kinds of heat employed for this purpose, viz, dry and moist heat. Of these two, moist or steam heat is generally used in the laboratory for sterilizing all kinds of nutrient media, for the reason that sterilization is thus accomplished by a much lower temperature.

We often hear of *deodorizers* and *germicides*. A deodorizer is only an agent that destroys offensive odors, *i.e.*, the chlorid of

zinc or sulfate of alumina, etc. The so-called "germicides" frequently seen in public and private lavatories are, as a rule, nothing more nor less than deodorizers. The agents employed only hide a smell; and the trickling of a small quantity of a solution of the chlorid of zinc over the bowl of a water-closet is about as effective, as far as the destruction of pathogenic germs is concerned, as so much cold water would be. Indeed, it has been observed that if germs capable of producing disease possessed an odor, and if offensive sewer gas contained germs, hiding the smell would be the best means of propagating germs and spreading disease.

A *germicide* is a true disinfectant; for it is, according to the modern definition, an agent capable of killing all micro-organisms.

I have briefly mentioned some few of the agents which are employed as disinfectants in the destruction of germs, as well as the chemical reaction which takes place in connection with the formation of a third compound; not that I think these points are entirely unfamiliar, but rather as an introduction, and because they touch upon the real subject of the evening, which is likely to prove of more interest to you, as dentists.

In 1891* I read a paper before the Odontological Society of New York, entitled "The Injurious Effect of Vegetable and Mineral Acids upon the Enamel of the Human Teeth, with some Curious Illustrations." I stated at the time that I should attempt to put the experiments in such order that they might suggest further inquiry in this special direction. After five years of thoughtful study and painstaking efforts, I believe the problem of filling the root-canals of teeth—at least the most difficult ones—has been solved, and that the *new method* which I shall introduce to you this evening will prove an aid in the preservation of the human teeth.

Of the illustrations which I have alluded to, those of you who were present at the meeting which I have mentioned will recall the simple experiment of placing a piece of zinc in strong sulfuric acid (H_2SO_4), and the acid had no effect on the structure of the zinc; but when a little water was added the zinc was chemically destroyed; that it was the sulfate of zinc resulting from the first chemical action, insoluble in the concentrated acid, which formed a protecting coat over the surface of the zinc; the addition of water dissolved the protecting sulfate and rendered further chemical action possible. I placed a tooth in strong tincture of the chlorid of iron, containing free hydrochloric acid, and demonstrated that the enamel of the tooth was not injured. It was protected by the oxid of iron, which adhered so closely to the surface of the tooth (as the sulfate of zinc formed a protecting coat to the zinc) that immediate chemical action was impossible. I illustrated in other ways; for instance, where mechanical interference, due to a chemical action and the formation of a third compound, prevented a strong acid from chemically destroying tooth-structure. Further-

*See Transactions of the Odontological Society, New York, 1891.

more, I demonstrated that, irrespective of any mechanical interference, the chemical destruction of tooth-structure did not depend on the *strength* of either an *organic* or *inorganic* acid.

When pure carbonate of lime, or common chalk, was immersed in strong acetic acid, on account of its viscidity chemical action was extremely slow; but when water was added the carbonate was immediately attacked and dissolved. The same thing occurred when a tooth was immersed in strong acids and simple syrup; and I repeat and emphasize, it is not the strength of acids which chemically destroys tooth-structure, but it is oftentimes a question of *solubility* or *fluidity;* water increases the destructive energy of almost all kinds of acids on the lime-salts of the teeth. There are one or two exceptions to the rule relating to the fluidity of a solution and the destructive energy of acids. When we immerse a tooth in the tincture of the chlorid of iron containing free hydrochloric acid, and dilute with alcohol instead of water, there will be formed on the surface of the enamel a compact, protecting peroxid of iron of the anhydrous form $Fe_2 (OH)_6$.*

The *new method* of disinfecting the difficult and so-called "inaccessible" root-canals of semi-devitalized teeth is based on the discovery and principle that a certain combination of acids will act upon a certain sensitized alloy quicker than on tooth-substance; that when such an alloy is inserted into the root of a tooth and subjected to the influence of one drop of such a combination of acids, there is an immediate chemical action which results in a thorough disinfection of the canal of the root and the formation of two compounds, viz:

(1) A reaction forming an oxid which envelops the metal and serves as a permanent filling.

(2) A reaction forming an albuminate after coming in contact with the albuminoid bodies, and the salts of the alloy, in the canal of the root. In other words, the animal matter in the tooth, whether putrid or otherwise, has changed its peculiarity through the influence of a definite chemical action.

Permit me to repeat one or two of these experiments, for they lead up to the nature of the acid and metal employed, and they also illustrate that it is not always the strength of an acid that chemically destroys the integrity of tooth-structure. I have in this glass some chemically pure sulfuric acid which, for reasons I have explained, is inert, so far as its destructive energy affects either the lime-salts of a tooth, the metal zinc, or the sensitized alloy.

When I add a little water, both metals are dissolved; the sensitized alloy being the most susceptible to chemical action, the tooth is decalcified. If I decrease the fluidity of the liquid by adding more sulfuric acid, chemical action is arrested. Chemical action also commences simultaneously upon both metal and tooth; and

*The following formula will show how the hydrated peroxid is formed from the anhydrous peroxid:

$$Fe_2O_3 3H_2O = Fe_2 (OH)_6.$$

the condition of solubility or fluidity which affects one also affects the other.

The following experiment illustrates how a strong acid quickly destroys a tooth without affecting metals: I will pour into a glass a small quantity of nitric acid, the strength of which is unchanged, although a foreign substance has been added and its color and specific gravity somewhat altered. Now, if I place in this acid a tooth, the enamel is almost immediately destroyed; but when I introduce one of these sensitive metallic broaches into the same acid, you will observe there is no chemical action.

If I employ the tincture of the chlorid of iron containing a small quantity of free *hydrochloric acid*, the result is just the opposite, for in this case, and for reasons before stated, the tooth-structure is not affected, but the metal is slowly dissolved.

My next experiment relates to nitrohydrochloric acid or *aqua regia*, and shows how quickly a metal can be dissolved without affecting the lime-salts of a tooth. I will employ for this purpose nitric acid which has undergone a slight modification, and will add about one-third hydrochloric acid. Into this solution I will drop a tooth with perfect enamel and a small piece of gold foil. In a short time it will be observed that the color of the solution has changed to that peculiar yellow-golden color which is characteristic of nitrohydrochloric acid in which gold has been dissolved; in fact, the gold has already commenced to dissolve. In other words, the gold will be dissolved and the enamel of the tooth will be protected; not to that degree that the tooth is protected in the strong sulfuric acid, nor in the tincture of the chlorid of iron, but protected from immediate chemical action.

The "Chemico-Metallic Method" for filling the difficult root-canals of semi-devitalized teeth presupposes no loss of tooth-substance. If perchance, in some cases, the energy of the acid employed is not entirely exhausted by its greater affinity for the metallic broach, and a surplus of the acid frees an infinitesimal quantity of the lime-salts, the chemical result, in addition to the oxids produced by the action of the acid upon the metal, must be a basic carbonate and phosphate.

The method presupposes that whenever a delicately-constructed steel broach can be introduced into a root-canal, whatever its length may be, whether straight or tortuous, whether it be filled with semi-devitalized matter or putrescent pulp and fetid gases, that canal can be thoroughly treated, disinfected, and permanently filled within a period of five minutes.

It is not claimed, however, that the method will cure an alveolar abscess, but rather to remove the cause which, in many cases, would produce an abscess.

It is not claimed for the method that every root-canal can be disinfected and perfectly filled, for some root-canals will not admit the introduction of any kind of an instrument, however delicately constructed—much less a medicament.

The dentist who asserts that he can accomplish such a thing, whatever method employed, and that he is never troubled with

abscessed roots after *he* has treated them, makes an assertion which, in the writer's humble opinion, is pretty nearly on a par with imbecility.

The acid employed in the "Chemico-Metallic Method" is the nitrohydrochloric acid slightly modified. In other words, nitric acid charged with chlorin; it is the chlorin which attacks the sensitized metal.

The specially-prepared acid resembles carbolic acid in many respects. Both are irritant poisons and coagulate albumen. When applied to the skin or mucous membrane, both produce a burning sensation, and an eschar is formed. Its escharotic action, however, is very superficial, which is probably due to its greater power to coagulate animal matter. Resembling carbolic acid, or creasote, it does not immediately destroy rubber-dam, linen fabrics, or tooth-structure. In one respect it is unlike carbolic acid. To a much greater degree, a combination with the alkalies entirely checks its chemical and physiological action. It is powerful enough to kill all micro-organisms that may be in the canal at the time of filling.

The metal employed is composed of silver, tin, and zinc. The last two metals mentioned are malleable and fairly ductile, but they both lack the necessary stability for a broach; hence a little silver is added.

The broaches are one and one-quarter inches in length, and made as stiff as possible without sacrificing affinity for the acid. They are cut off with a pair of scissors specially made for the purpose. The pair which I hold in my hand has, as you will observe, very short blades placed at right angles. Another pair with short curved blades, presented to me by Dr. Northrop, I have found useful for the purpose; but almost any pair of short and curved-bladed scissors will answer, especially if a little nick be filed in one of the blades near the point to catch and hold the metal. To facilitate the operation, cut the broach off after it is in the root only halfway; it can then be pushed in with any suitable flat-pointed instrument. I am in the habit of using, for this purpose, one of the old-fashioned inverted cone-bur instruments. Whatever shaped scissors may be employed, the blades will rapidly corrode, and can be used only for this purpose.

As heretofore stated, the method relates to difficult and "inaccessible" root-canals. Its application is particularly directed to the roots of the following teeth:

(1) The anterior roots of inferior molars, where in each molar there is *one root* and *one foramen* and *two delicate hair-line canals.*

(2) The roots of inferior bicuspids with one or two small canals.

(3) The roots of inferior centrals and laterals.

(4) The *two buccal roots* of all the superior molars.

(5) The superior bicuspids, containing *two delicate canals* instead of one.

(6) The superior laterals, with hair-like canals.

By way of illustration, suppose we have the anterior root of an inferior molar to fill. The posterior root having, as a rule, but one

canal, offers but little, if any, difficulty to a skillful operator. But for the proper filling of the anterior root, there are a number of difficulties to overcome. First, it is inaccessible; then a front view of this root shows a thin septum of bone separating two distinct hair-like canals, from a half to three-fourths of an inch in length, which, in size, will only admit the smallest kind of a flexible steel broach. (See cut.) We often meet with roots such as I have described, where it is possible to insert a steel broach as far as the apical foramen, but impossible to introduce medicated cotton or properly fill with any known material. Now, in such a case, try the *"Chemico-Metallic Method."* After properly adjusting the rubber-dam, and carefully removing all the moisture from the cavity, insert into the root-canal a fine flexible steel broach. Having ascertained the exact location, size, and length of the canal, we substitute the flexible sensitized metal; then touch the metal with one drop of the prepared acid. In two or three seconds we find that a reaction has taken place throughout the length of the root-canal. An oxid has been formed and the animal matter in the root has undergone a metamorphosis (it has become an albuminate of the sensitized alloy), and the root has been completely disinfected.*



Anterior view of anterior root of lower molar with two pulp-canals disinfected and filled by the chemico-metallic method; root filed away, showing metal, oxid, albuminate, etc. Time of operation three minutes; putrescent pulp in canals not extracted.

Cut off the end of the sensitized alloy, and the root is disinfected and filled. But it is not necessary to leave the metal in the root. Suppose we desire to crown a root that first requires disinfecting. All we have to do is to *remove the metallic pin,* enlarge the root-canal, and adjust the crown in the usual way. Now let me illustrate the manner in which this acid and metal act on albuminoid substances. I hold in my hand the root of a cuspid with an enlarged canal. I will now substitute for the dead pulp, which might be present, but is not, a small piece of calf's liver, which is in a putrefactive state. As you will observe, I insert the alloy, which is in the form of a broach. I now touch the metal with a drop of the acid. You observe the chemical action which is produced by the acid and metal coming in contact. The reaction has already taken place; the oxid has been formed, the peculiarities of the animal matter in the root have been changed to the extent that it is very doubtful if putrefaction can ever take place. As a further illustration, I have immersed in the acid contained in this bottle a piece of liver which happens to be part of a guinea-pig. If it were any other organ of an animal's

*Whenever a metal is subjected to the influence of an acid, on account of chemical action, there must be a generation of gas. In the "Chemico-Metallic Method" this gas is eliminated in the pulp-cavity at the point of entrance, and with it are embraced the fetid gases contained in the root-canal. This chemical action may continue for a period of five or ten minutes. It may appear advisable then to employ a cotton dressing and gutta-percha, and postpone permanent filling of the cavity for a day or two.

body, however, the result would be the same. As you will observe, in appearance the character of the animal matter is entirely changed; it has been coagulated. Microscopical examination reveals the products of cellular degeneration. Whether putrefaction would ensue after the acid is removed by a thorough washing I am unable to say; but I feel safe in claiming that any small quantity of dead animal matter that may be left in the root of a tooth, and then subjected to the influence of the acid, plus the salts of the metallic alloy, thereby forming an albuminate, will so change its character that putrefaction will be an impossibility.

In this connection I have prepared in a saucer a small piece of calf's liver which has been studded with the sensitized broaches and allowed to remain until it has become putrid. When I pour a small quantity of the acid upon it, a fierce chemical action takes place: the chlorin attacks the metal, the fumes of nitrohydrochloric acid are thrown off, the dead animal matter is coagulated, the bacteria are destroyed, the oxids and the albuminates are formed, all odor disappears, and disinfection is accomplished. I have made a series of experiments relating to the merit of the various antiseptic solutions prepared for dentists, especially the so-called balsamic preparations, the principal ingredients of which are boric acid, oil eucalyptus, oil gaultheria, etc.

Of all the preparations ending with the syllables "in," "tin," "id," "sol," "tol," the one that ends *fine* is the one that ends with "mol." I refer to euthymol as being the best and strongest of all the balsamic solutions; for when the experiment just made is repeated, and a small quantity of euthymol is poured upon a piece of decaying liver, minus the metal points, there is less odor perceptible; and altogether it is a superior antiseptic. Any solution which hides the smell of a dead pulp is a valuable acquisition to a dental office.

The following table of experiments indicates the potency of euthymol as a germicide and antiseptic.

The gelatin plates are made by taking up a small amount of the culture of the germ on a loop of platinum wire, introducing it into the euthymol solution contained in a test-tube, and stirring thoroughly. The platinum wire is then sterilized in the flame of a Bunsen burner. Next, a wire loop bearing a small quantity of the euthymol solution containing the germs is taken out and stirred in a tube of sterilized softened gelatin. This tube of planted (inoculated) softened gelatin is then poured out into a small sterilized flat-bottomed glass dish with glass cover, which is shaken well to distribute the gelatin over the bottom. This is allowed to stand for three days at room temperature, and then the colonies are counted. The colonies (the small whitish dots formed in the gelatin upon standing) are the progeny of each individual germ not destroyed by the euthymol.

In the first series of experiments, gelatin plates were planted with typhoid-fever germs that had been exposed to the action of 100 per cent. euthymol for different periods:

Plates planted immediately after immersion of germs in euthymol.	Planted after five minutes.	Planted after ten minutes.	Planted after fifteen minutes.	Planted after thirty minutes.	Planted after sixty minutes.
Few colonies.....	0	0	0	0	0
Few colonies.....	0	0	0	0	0
Few colonies.....	0	0	0	0	0

Second series of experiments, 25 per cent. euthymol used instead of 100 per cent.:

Plates planted immediately after immersion.	Planted after five minutes.	Planted after ten minutes.	Planted after fifteen minutes.	Planted after thirty minutes.	Planted after sixty minutes.
Many colonies.....	0	0	0	0	0
Many colonies.....	2	0	0	0	0
Many colonies.....	1	0	0	0	0

Third series, 100 per cent. euthymol used; sputum substituted for typhoid-fever germs:

Plates planted immediately.	Planted after five minutes.	Planted after ten minutes.	Planted after fifteen minutes.	Planted after thirty minutes.	Planted after sixty minutes.
No colonies or growth...	0	0	0	0	0
No colonies or growth...	0	0	0	0	0
No colonies or growth...	0	0	0	0	0

Fourth series, 25 per cent. euthymol used with sputum:

Plates planted immediately.	Planted after five minutes.	Planted after ten minutes.	Planted after fifteen minutes.	Planted after thirty minutes.	Planted after sixty minutes.
No colonies or growth...	0	0	0	0	0
No colonies or growth...	0	0	0	0	0
No colonies or growth...	0	0	0	0	0

Fifth series, 10 per cent. euthymol used with sputum:

Plates planted immediately.	Planted after five minutes.	Planted after ten minutes.	Planted after fifteen minutes.	Planted after thirty minutes.	Planted after sixty minutes.
Three colonies	0	0	0	0	0
0	0	0	0	0	0

Beef bouillon tubes were planted with dust, typhoid-fever and pus germs, then different percentages of euthymol added, and the tubes placed in an incubator for forty-eight hours. The following table shows the germs used, the percentage of euthymol added, and the resultant growth, if any:

BEEF BOUILLON TUBES.	EUTHYMOL ADDED.						
	NONE.	75%	5%	3%	7%	11%	15%
Inoculated with ordinary dust	Infinite growth	Some growth	Slight growth	Slight growth	No growth	No growth	No growth
Inoculated with pus germs	Infinite growth	Some growth	Slight growth	Slight growth	No growth	No growth	No growth
Inoculated with typhoid germs	Infinite growth	Some growth	Slight growth	Slight growth	No growth	No growth	No growth

Each of the above three experiments was repeated, with precisely the same results.

I will now immerse a tooth with perfect enamel in the acid (in fact, this same tooth has already been immersed in the dental acid for a period of one hour). I will leave it there for a minute or two. You will observe that when I remove it I take it up on a piece of absorbent cotton and carefully wipe it; to have it come in contact with water, even at this time, would result in a chemical action and a very serious detriment to the tooth-structure. You will observe that the enamel of the tooth has not been injured in the slightest degree. But when I place in the same acid a small piece of the sensitized alloy, you will observe what may be called a chemical explosion. If I add a little of the concentrated sulfuric acid, chemical action is arrested. And why?

(1) Because I have changed its fluidity; it is now viscid in character, and protects the alloy by a mechanical interference, just as I have told you that the enamel of a tooth is protected in strong acid or with a thick syrup and acid.

(2) For the reason that the surface of the alloy has probably been covered with a sulfate which is insoluble in this medium. If I add a little water, however, the protecting sulfate is dissolved and chemical action commences again, just as it did when I added a little water to sulfuric acid containing a piece of common zinc. And, for the same reasons, when I immerse a tooth in the acid, there is no chemical action.

It would seem that we can accomplish by this method about all that can be accomplished, viz, eliminate the fetid gases in the root; coagulate the dead animal matter; destroy the micro-organisms; form two new compounds—the oxid and the albuminate of the sensitized alloy—and, finally, disinfect and thoroughly fill the root. What more is there left for further putrefaction, and what doubt can there be concerning the "permanency of asepsis"?

There are one or two objectionable points associated with this "method." The vehicle employed for disinfection is a powerful acid, and should be protected and used as carefully and intelligently as carbolic acid or creasote. It stains the fingers, and if spilled upon the table or bracket, steel instruments will rapidly corrode and oxidize. The "method" is not intended, however, for careless operators. Accepting whatever objectionable features with which it is associated, it may be said that its possibilities, as a chemico-mechanical achievement, have been amply demonstrated by clinical experiments during the past year and a half, and that as a practical adaptation to a purpose, it will save time for the patient and lighten the toil of the dentist.

Esthetics in Dentistry.

BY J. N. FARRAR, M.D., D.D.S., NEW YORK, N. Y.

(Continued from page 1004, vol. xxxviii.)

Mechanical Aspects of Regulating Teeth.

We will now turn our attention from the esthetic aspects of the subject of regulation of teeth to the mechanical, or the application of force, how and where it may be applied, and the consequent effects; in this I shall point out some commonly-accepted though fallacious notions, and offer some conclusions of my own.

Do teeth always swing on the apices of their roots?—It has been thought that while correcting teeth, they always swing upon their apices. While this is true in regard to lateral movements of teeth (movements parallel to the alveolar ridge), it is not true of cross movement of the inward movement of front upper teeth.

In the correction of protruding *upper* teeth they swing upon their middle part, the fulcral point being a very short distance above the necks of the teeth, their main bearing being against that which might be called the densest part of the alveolar process. When posteriorly acting force is applied to the end of the crowns, the apices of the roots tend to move more or less anteriorly, and sometimes the roots carry along with them the upper part of the upright plates of the maxillary bone.

It is this strain upon the bone which causes many patients to complain that they feel at times a "soreness in the upper lip, just under the nose." If, however, posteriorly acting force be applied at the necks of the teeth, instead of at their cutting ends, they seldom complain of such soreness, because the strain is less, and the apices of the roots are not materially started forward. As a consequence of the moving forward of this bone, the upper part of the lip and even the end of the nose is similarly affected. Strange as it may seem, ever since dentists have corrected protruding teeth they have, until of late, been unconsciously moving forward more or less the upper part of the lip and the tip of the nose.

Do crowns of protruding teeth move downward on a curve while being corrected?—Another point worth remembering is that, as a consequence of this tilting of teeth upon their necks, the crowns of protruding upper teeth, when undergoing correction, do not (as has been taught in the past) swing downward upon a curve, leaving the cutting ends on a considerably lower plane. Therefore, I think that the old belief that it is necessary to apply an inwardly, as well as a posteriorly acting force, with the view of preventing what has been called "elongation of the teeth," is mainly rroneous; indeed, I have never seen a case where I thought it was necessary to apply upward force while correcting protruding upper teeth. There are some cases, however, where *upward* force is necessary in order to get a *backward* force; for illustration, those cases requiring the use of the skull-cap.

Can considerable space be obtained by widening the arch?—Another erroneous and generally accepted impression is that considerable

extra space can be gained for the liberation and arranging on line jumbled front teeth, by widening the dental arch. I have seen casts of cases brought before societies that showed ridiculous failures, instead of successes, where attempts had been made to increase space by widening the arch. After having broken up the antagonism of the side teeth (including the cuspids) by moving them too far outside the lower teeth and finding that, after all, it was impossible to get the front teeth into line without making almost a straight line, a bicuspid on each side was then extracted to gain the necessary space to curve this line by moving the cuspids posteriorly and upon the territory of the extracted teeth; and having finally evened the front teeth and left a space about one-eighth of an inch behind the cuspids, pronounced the case completed. Well, the casts showed that the cases were not successfully completed.

Such esthetic failures are too often paraded before young dentists for their good. Had a first or second bicuspid on one or both sides of the arch been extracted at the beginning of the operations and the cuspids been immediately moved posteriorly sufficient to liberate the jumbled incisors, there would not only have been ample room for all the front teeth, but there would have been left no gaps behind the cuspids nor would the occlusion have been injured, and the results of the operations would have been satisfactory in every respect. Of course there remains the question, *which* tooth or teeth ought to be extracted?

Extraction to make room for correction of protruding teeth.—In regard to this point (extraction) much depends upon the matter of anchorage, if the teeth are to be corrected by machinery. If the first bicuspid be extracted, the second bicuspid and molars will be left, thus constituting a firm anchorage; but if the second bicuspid be removed, there is left one tooth less for anchorage, and one tooth more to be moved. If the extraction of the first bicuspid on each side will leave one tooth more for anchorage and one tooth less to move, the operation will be shorter and easier.

Anchorage.—In deciding the question of extraction the condition of the tooth must, of course, have weight; for illustration, if the second bicuspid is badly decayed, that tooth might be the one to extract, and then make space for the cuspid by moving the first bicuspid into its place. In my own practice I aim always to include all teeth for anchorage that are practicable, not only to prevent these (anchorage) teeth from being moved, but also to prevent soreness of their sockets. The exceptions to this rule are: Cases where a sufficient number of teeth for anchorage are not present, or where it is necessary to reverse the anchorage and move side teeth forward to fill interdental spaces. When a first molar has been extracted, making it necessary to use the second and third molars for anchorage, to move the bicuspids posteriorly they (molars) should not be drawn upon for moving more than one tooth at a time; even then they should be frequently examined, in order to avoid too great inclination forward. If the anchorage teeth do move forward, they should be given liberty to permit

of return to their normal positions. It should not be inferred from this, however, that slight starting of the anchorage teeth is dangerous to a case, for all anchorage teeth are liable and are expected to move somewhat. The question to decide is, how long such started anchor teeth can be safely used to further the operation. If the inclination is slight and the occlusion is not materially disturbed, these teeth will generally settle back into their former and normal places, even if they are slightly elevated in their sockets. Should they be elevated considerably, however, it may require months for them to fully correct themselves. Because of this natural tendency of raised teeth to finally settle back and down into their sockets, it will be seen that too great haste to grind such teeth to correct occlusion, after having apparently completed an operation, would not be wise.

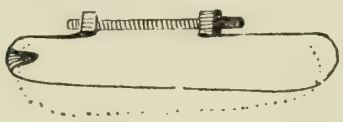
We sometimes hear dentists complain that they cannot accomplish that which has been claimed to have been done by other dentists, who have given considerable attention to the regulation of teeth.

In our professional literature we sometimes read that some dentists are of the opinion that "bands" do not afford sufficient anchor-

FIG. 9.



Drawing a cuspid back by a clamp band.



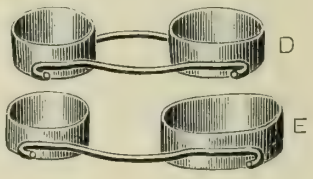
Edge view of an anchor clamp band.

FIG. 10.



Showing the proper and improper form of the posterior part of an anchor clamp band.

FIG. 11.



age for moving cuspids posteriorly, that the anchorage teeth tip forward before the cuspids will start. So far as I have traced the cases of these unfortunate dentists, the bands were either of improper size, or were improperly applied; generally they were not of a size that would embrace more than one tooth, and were so applied that the draught acted from wrong points on the bands. In other words I found that single tooth ferrules were the "bands" used, instead of large clamp-bands or two or more ferrules connected in some way, and that the force acted from points near the antagonizing ends of the teeth. A good rule of practice may be stated thus: First, a drawing force should act from the anterior part of the anchor band, while a pushing force should act upon the posterior part; second, the draught of drawing engines (attached to posterior parts of anchor bands) should be most powerful at the gum-margins of the bands. (See Figs. 9, 10, 11.)

There is always liability of moving anchor teeth by any kind of lateral force applied to them, but tipping of teeth to an injurious extent seldom results from philosophical management.

There are cases where a single molar would be sufficient anchor-

age to move a cuspid where it is necessary to move the molar also, but it is not safe to make it a rule to use only one tooth for anchorage. If a single tooth band be used, the force should generally act from opposite sides and not from one side only, unless it is desirable to turn the anchor tooth in its socket.

As side teeth can be moved anteriorly, or posteriorly, it will be seen that whenever side teeth are to receive a force which will cause them to move posteriorly, and the space anterior to them is needed for evening teeth, anterior to the space, calculations should be made to guard against their return to their former positions. So, also, when the side teeth are drawn forward to close interdental spaces, provision should be made for holding them there until they become fixed, or until new teeth erupt posterior to them, and are in actual contact with them. The former remark is especially applicable to those cases requiring correction of protruding teeth in which the side ones are drawn forward more or less, from the draught upon the front teeth; the latter remark is nearly as applicable to cases of receding teeth, that require to be moved anteriorly, causing thereby the anchor teeth to move posteriorly. To be careless in these matters, or to be satisfied with simply evening the teeth, or placing them on line without making provision to prevent the return of corrected jumbled teeth, is very apt to lead to disappointment.

Anchors.—Two or more ferrules may be held in direct contact by solder, but a better ferrule anchor is made by conecting two ferrules, at a short distance from each other, by one or two platinum wires, the ends being soldered to the sides of the ferrules, leaving a space between for a middle tooth with no ferrule upon it.

Fig. 11, *d* and *e*, represents two such anchors for use upon bicuspids and molars; the ferrules, which are about one-eighth of an inch in breadth, are connected, as shown, with platinum wire about the size of a pin. The ends of these wires may, by being bent hook-like, serve for attachment of elastic rubber rings, or screw jacks. By bending the middle part of these wires, the ferrules can be moved nearer each other, or farther apart, thus rendering them adjustable, so as to go easily upon the teeth.

Esthetic mechanisms.—Another phase of high art, as applied to dentistry, is shown in the esthetic phase of machinery. Failure may arise from lack of skill on the part of the operator, or through perversity of the patient, but many failures can be traced solely to the patient's disgust at the lack of beauty and delicacy in the things put into their mouths. If conspicuously black mechanisms, especially if not skillfully made, do not encourage patients, is it at all strange that many operations end in failure that might end in success, were bright and beautifully-made gold mechanisms used?

(To be continued.)

Molding Tooth-Forms.

BY HENRY H. BURCHARD, M.D., D.D.S., PHILADELPHIA, PA.

Within the past few years the system of instruction known as technic teaching and its accompaniment, manual training, have come to form a permanent feature in the methods of instruction in dental colleges, and it admits of no doubt that in the future it will claim even a greater degree of attention and receive wider application than at present. The method, intelligently applied and assiduously followed, demonstrates that it has greater intrinsic value than any other system ever offered. The time when didactic teaching alone in medicine, dentistry, or any of the collateral sciences was relied upon as the means of establishing in the mind of the student a comprehensive and working knowledge of the subject presented is rapidly passing, or is past. Teachers in the colleges of science now recognize clearly that the mind-pictures transferred to a pupil's cortex through the medium of the auditory nerves are more often vague than accurate; it is found, moreover, that the dictum of psychology that the vividness of a mind-picture is in the ratio of the strength of the impression is entirely true; therefore, the more impressions that are received, the greater number of channels through which they are transmitted, and the greater the accuracy with which the several elements are coördinated the better will be the picture; that is, the more complete will be the knowledge. In dealing with such a subject as dentistry, as with many other subjects, there is an additional factor for consideration,—the training of the motive apparatus to such an extent and in such a manner that it is entirely and perfectly under the control of the idea centers, so that when the mind forms a picture the motive apparatus will give it tangible form, and with a degree of accuracy based upon the clearness of the mind-picture. The philosopher would call this the materialization of form; all of which means that a student knows a thing better if he receives his knowledge of it through three, four, or five of his senses than if he becomes acquainted with it through a lesser number of these factors. Furthermore, in dentistry it is essential that he be able to direct minutely, and if possible automatically, the motive apparatus through which his multitudinous operations are performed. In accordance with these opinions or, as they are held to be by most teachers, these facts, the technic system has found application in the teaching of the several branches studied at dental schools. In the chemical, prosthetic, operative, pathological, bacteriological, and histological departments the system of technic teaching is in force and has demonstrated its worth. Its next applications must be in experimental therapeutics and practical anatomy. The present essay deals with but one aspect of this subject, viz: the architecture of the teeth and the demonstration of its features.

It is a mooted question, and one by no means easy of solution, what method shall be adopted of giving a student a requisite knowledge of tooth-forms. This is or has been primarily the object of the introduction of the carving and molding in plastic

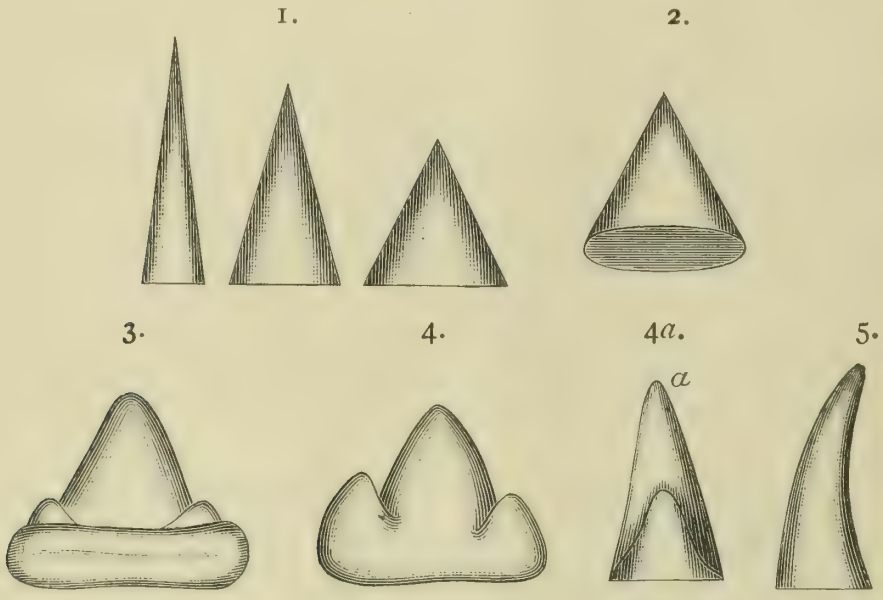
materials of typical tooth-forms. The question of carving hard, resistant bodies, as for example ivory, into tooth-forms involves an amount of labor and time not commensurate with the extent of actual knowledge acquired through such means. The object being to familiarize a student with typical forms, that method should be acceptable which shall most quickly and directly bring about the result.

Aside from the shaping of typical forms based upon a model which is copied in detail, it appears to the writer that another element should receive consideration, namely: the teaching of an anatomico-architectural principle recognized by dental anatomists as the basis of tooth-forms, and which is needlessly ignored in the usual technic method of molding or carving tooth-forms; the principle being the evolution of typical tooth-forms from a primitive cone. We find this subject touched and rarely dwelt upon by the anatomist; as a rule, the statement is made, but is rarely used as a basis of actual demonstration. The following method of demonstration and elucidation is suggested, and while it is undoubtedly susceptible of great improvement, it may serve as a basis for a rational laboratory exposition as to the composition of tooth-forms.

Of all materials suggested for molding, there is probably none which contains so many advantages as plastic clay. It may be readily and quickly manipulated by a student, so that but a short time is required to develop that coördination between a clear idea and the muscular actions which give the idea visible form. This manual training subserves another useful purpose, that of familiarizing a pupil with the manipulation of plastic material; in fact, it would probably be preferable that a paste of plaster of Paris be used as the molding material were it not that its setting is too rapid, in order that the art of properly manipulating plaster be readily acquired by students.

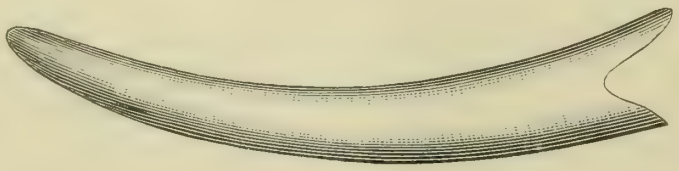
Starting from the primary basis, that tooth-forms are modifications, multiplications, and multiplied modifications of a simple cone, the first step is naturally the formation of a simple cone. An observation will demonstrate that in many of the conical teeth the diameter of the base is about half the height, therefore a cone of these dimensions is made. This will represent approximately the typical tooth-form found in many fishes and in the sperm whale—the cachalot. Place the cone between two of the fingers of each hand, and compress it until two sharp edges result upon either side, and there results the outline form of a shark's tooth (2). More slender cones are made, as shown in Fig. 1; these, if given a slight curve, will represent the forms of teeth found in many snakes. If the student will roll out a sheet of clay to about one-quarter inch thick, fold it into a long funnel, then attach this to the convexity of a bent cone about eight inches long, it will represent the poison-fang of the rattlesnake; the surface receiving the funnel is first flattened, and the funnel pressed upon it, until the entire piece represents a curved cone, the funnel being a canal along the face of the fang. Make another cone;

while holding and compressing to an ellipsoid the base of the cone, between the thumb and forefinger of the left hand, compress the apical two-thirds of the cone into a flattened form, having thin but rounded edges, and there is the premolar of the hyena (3). To the first cone add two others, about one-fifth the size of the first, pressing them against the sides of the large cone; then compress all three, and there is but little molding required to reproduce the typical form of the premolar of the carnivora (4 and 4*a*).



Take a simple cone, and while holding its base in the left hand deflect the apex of the cone, or rather curve the axis of the cone, and there is the form of the tooth of many fishes and of the reptilia (5). Make a cone the diameter of whose base is one-sixth or less of the axis of the cone; bend it, and there is a representation of the elephant's tusk (6). Make the relation of base to length as 1 to 12, curve it, and the form of the walrus tusk is reproduced. Make an elongated cone, and while its length is resting in the palm of the left hand, the palm and fingers forming an arc of a circle, draw and press upon the exposed sides of the cone until they are

6.

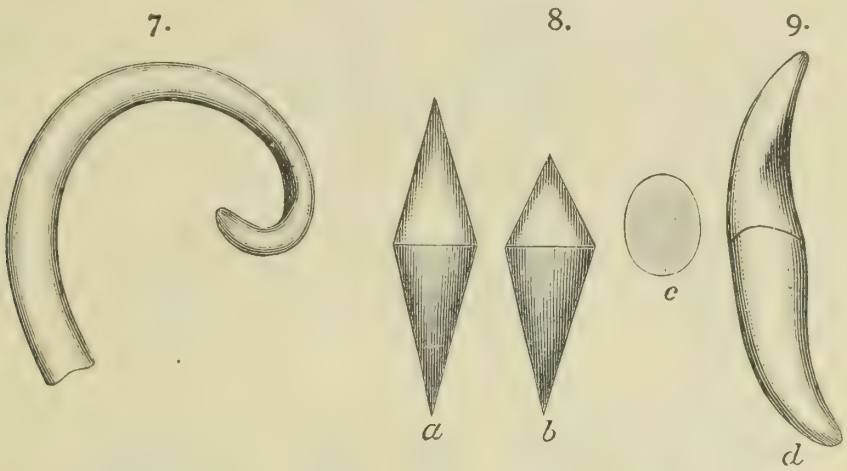


flattened, and the form will resemble approximately the tusk of a boar. Make a very long cone, curve it into a semicircle, and it will resemble a tusk of the babiroussa (7). The process may be continued, simulating the tooth-forms of many animals.

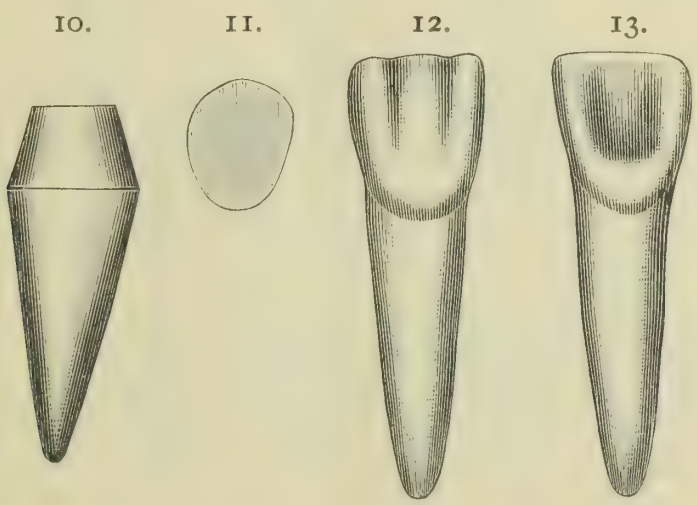
The basal form of the teeth of mammals is not the single but the double cone, one cone for the crown of the tooth and one for its root (8). If such a double cone be made, its axis curved and its sides slightly flattened, it will represent the typical carnivorous tooth, the canine (9).

These examples are cited to show the applicability of the method to the molding of general forms; the same method is equally applicable to the shaping of the forms of human teeth.

Make a double cone, that representing the root about half again as long as that representing the crown. To form the incisors from the primitive cone it is necessary to materially alter its form. While it is true that the forms of the incisors, as those of the other teeth, are derivatives of the cone, they are modified from truncated



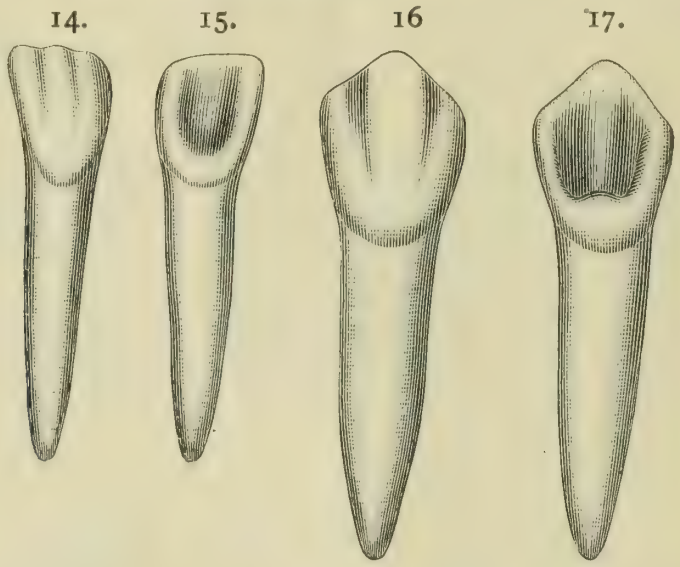
cones. The apical third of the cone is therefore cut off; the cone is truncated (10). The double cone is manipulated between the fingers (10) until the junction of the bases is oval instead of round (11). Now, resting the index and second finger of the left hand along one face, the outer, of the truncated cone, pressure is exerted upon the opposite face of the cone by the distal half of the first finger of the right hand. The cone will be flattened, and the edge



will be found almost straight. The outer face will be marked with three ridges, corresponding with those found upon the labial faces of the incisors (12); there will be a median ridge, and one at either side of the tooth. Upon the lingual surface the finger has made a depression, on either side of which rises a lateral buttress (13). The ball of the finger pressing in toward the base of the crown cone or the neck of the tooth forms a well-marked ridge, a cingulum, encircling the neck portion of the crown and joining the

lateral buttresses. A smaller cone is truncated and manipulated in the same manner, except that instead of holding the fingers of the left hand flat they are held at an angle to one another, forcing inward that portion of the clay corresponding to the distal half of the tooth, and the little finger of the right hand is used to compress what will be the lingual side of the form, and a fair representation of a lateral incisor results (14 and 15).

For the cuspid the cone remains untruncated; the thumb and forefinger of both hands are employed to make this form. Upon either side of the median line, the outer wall of the cone, an index finger is placed parallel with the median line; upon the lingual side the balls of the thumbs grasp the cone at points opposite to the tips of the index fingers; pressure is exerted, and the mass of clay will assume the typical cuspid form. That part between the index fingers upon the labial side being raised into a ridge joining the apex of the cone, the fingers form the lateral depressions beyond which the mesial and distal ridges are raised (16). The pres-

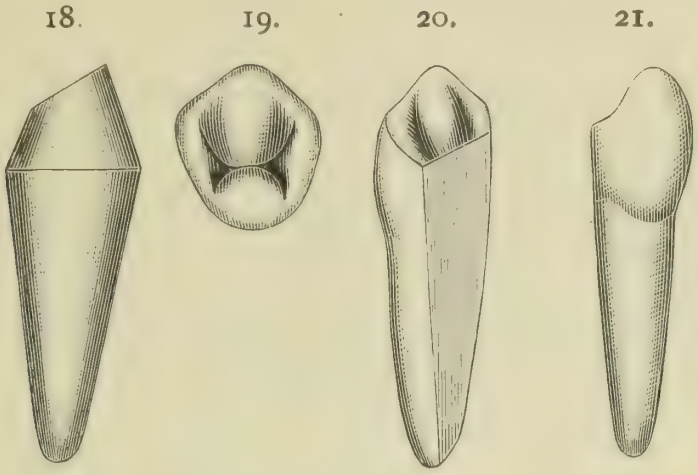


sure of the balls of the thumbs at the lingual side has formed three ridges,—a median, a mesial, and a distal,—which are buttresses to the angles and point of the tooth; the ridges join above the neck in a rounded elevation (17).

The form of the first lower bicuspid may be produced from the single cone; the cone is truncated at an angle (18), and pressure upon the top is made with two fingers of the right hand, the fingers being separated so that the pressure causes the raising of a ridge between the fingers. This outlines the typical form of a first lower bicuspid; the further shaping is readily done with the ball of a finger (19). The upper bicuspids are usually described as being formed of two primitive cones; that is, the double cone is the basal form. Their actual forms are those of a double cuspid. The markings upon their surfaces correspond with those found upon the cuspid teeth. If two cuspids are molded according to the directions given, and are flattened at what should be their lingual sides, the flattening extending to nearly half the depth of the teeth (20 and 21), and the flattened surfaces are pressed together, there

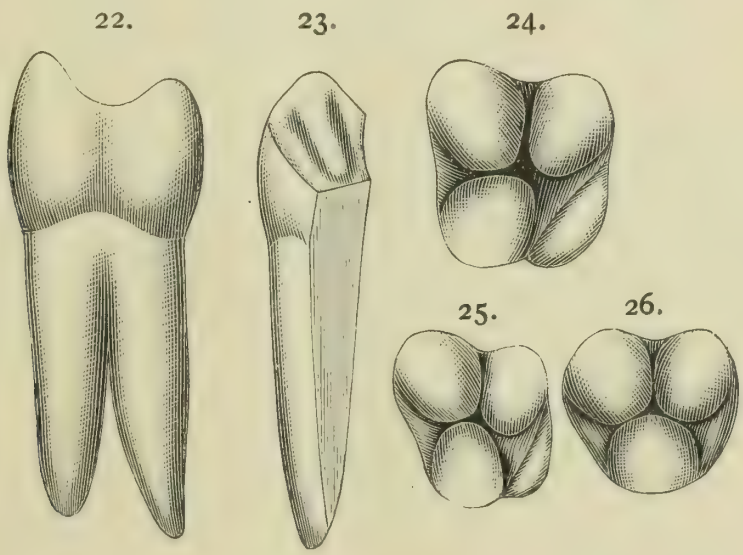
results a form which requires but little subsequent molding to give it the typical bicuspid form.

The median buttresses mark the triangular ridges; the joining of the lateral buttresses marks the peripheral ridges or edge girders of the bicuspid. The flattening of the root cones, extending not quite into the axes of the basal cuspids, shows the outlines of inner



and outer roots. In first bicuspids having broad crowns it will usually be found their cusps are long and the root bifurcated (22). In molding this form the flattening of the lingual sides of the cuspids is to a lesser depth (23).

The upper molars are described as being formed from three basal cones. This is a statement which always requires careful explanation to make it explicable to a student, who recognizes the

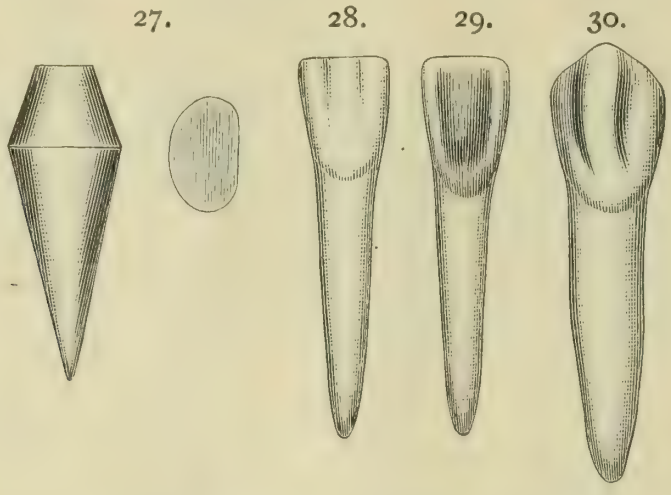


presence of four cusps upon these teeth. It will be observed that there are but three roots, all differing in size; the root which bears the double cusp is largest. The form is made by taking three cones of decreasing size and shaping them into cuspids; the largest is to be the lingual section, the second in size the anterior-buccal section, the smallest the disto-buccal section. The surface of the anterior-buccal section is flattened where it is to join the lingual section; the surfaces of mesial and distal-buccal sections are but

slightly flattened; the flattening of all sections is to be made so that the transverse axes of all three cuspids cross at a point which marks nearly the center of the tooth.

It will be observed now that the junction of the lingual with the anterior-buccal section is by the lateral buttresses of the respective cuspids, the junctions of the buttresses forming the anterior girder. The junction of the buttresses of the disto-buccal and lingual sections also forms a ridge, the diagonal girder of the first molar; the sulci of each basal cuspid all point toward each other and join in the well-marked pit found in the upper molars; the lines of junction of the flattened surfaces of the cuspids mark the longitudinal and transverse fissures.

If, while the clay is plastic, a small and poorly-defined cuspid be pressed upon the disto-lingual surface of the lingual cusp, it will represent the disto-lingual cusp. The line of junction with the basal triangle, the three cuspids, marks the lingual fissure, a distinguishing feature of the upper molar (24).



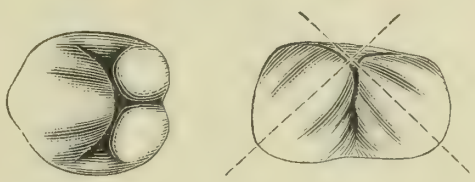
In shaping the upper second molar, the three cones are subjected to greater pressure in joining them, so that the boundary of the form shall be a scalene triangle. The additional cusp is to be well flattened before being added to the three cones. In this tooth, as in the first molar, variations as to the extent of the diagonal fissures depend upon the intimacy of the blending of the primitive with the lingual cusp (25).

In forming the third upper molar the three cuspids, the largest to be at the lingual aspect, are so placed that the axis of the latter is opposite the line of division of the buccal sections; pressure upon the sections will now outline the several sulci and raise the marginal girders (26).

In forming the basal cone for molding the lower incisors they are made more slender than those for the upper incisors, and as soon as the top cone is truncated the mass of clay is to be flattened laterally until it has an elliptical section area (27). The chisel-shaped crown form, triangular, whether viewed labially, lingually, mesially, or distally, may be readily made by resting the truncated cone between the first and second fingers of the left hand, the axis of the double cone lying in the length of the hand, and drawing

out the clay by means of pressure and stroking with the ball of the right thumb (28 and 29). The cones for the lateral incisors will of course be slightly larger than those used for the centrals. In forming the lower cuspid the cone is not truncated; instead of grasping the lingual wall of the cone with but one finger of each hand as in forming the upper cuspid, the tips of four fingers rest and press upon it; the mesial and distal sections of the tooth are then formed by pressure and stroking of the balls of the thumbs; the pressure of the thumb forming the distal section is to be greater, so that the median ridge of the labial face shall be curved toward the median line of the mouth, and the distal cutting-edge be made longer than the mesial. The pressure of the fingers upon the lingual side will have given the faint markings seen upon this portion of the tooth (30). In forming the crown of the second lower bicuspid the outer cuspid is formed first partially hardened, and flattened but little where it is to join the inner, the lingual cusp. The second, the lingual, cuspid is formed, and while it is soft it is pressed firmly upon the buccal section, the pressure flattening the wall of the lingual cusp and changing its occlusal tip from a point to an edge (31).

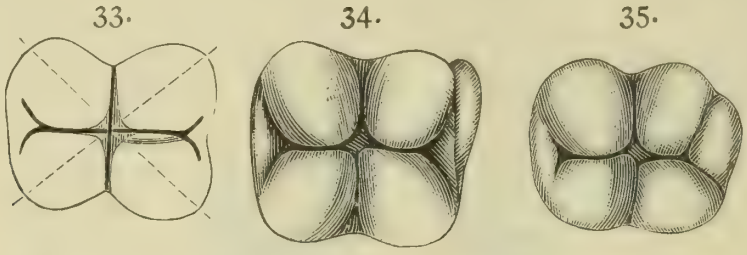
31. 32.



The semicircular sulcus which marks the base of the buccal cusp is outlined and the lateral girders raised. The indentation marking the lingual cusp into two sections is to be then made.

In a well-formed lower molar the junction of the four basal cuspids is well marked. A hasty examination of the crowns and roots of a lower molar might convey the impression that it is a double bicuspid, but a more careful survey will exhibit a well-marked point of differentiation; in the bicuspid the planes of the longitudinal axes of the primitive cuspids form a common plane, the median division of the tooth; in a lower molar it will be seen that the corresponding planes of the cuspids are almost or quite at right angles with one another (32), so that if a lower molar be sawed across diagonally the planes will pass through the median lines of the cuspids (33). In forming these teeth, therefore, the four basal cuspids are made and are first united to one another in mesial and distal pairs in such a manner that the median plane of each cuspid is at right angles to the one with which it is joined. The sections are pressed quite firmly together, or are both flattened at the surfaces to be joined, so that the roots are fused and yet exhibit the double form. The anterior and posterior halves are pressed together, while a finger is held between the ends of the roots to keep them separated. By altering the position of the finger a number of irregularities of root curves may be imitated. The position of the sections will mark the longitudinal and trans-

verse sulci of these teeth; occasionally the pressure will raise at the intersection of these sulci a small rhombic mass resembling those often found in this situation. The additional cusps to the lower first and lower third molars are made by pressing a small cuspid crown upon the disto-buccal section (34). The line of junction of this additional piece will outline the extra sulci found in these teeth. In adding the piece for the third molar it is placed almost upon the posterior wall to complete the oval form of this tooth which distinguishes it from the rhomboidal form of the first molar (35). In addition, the crown of this tooth is to be compressed laterally to mark the general oval; the pressure also causes those irregularities of sulci arrangement commonly found associated with lower third molars. The roots of the separate cuspids, particularly when forming a first lower molar, may be but partially joined, or again be made separate to imitate common abnormal-



ities of root arrangement. In the lower third molar the roots as well as the crown are to receive pressure to drive them together, imitating the fusion and backward curve of the roots of this tooth.

It is to be understood, of course, that the forms produced in the manner described are not exact; to make them with the precision demanded when a close familiarity with topographical anatomy is to be developed requires that each tooth receive additional carving and smoothing. The writer has found by repeated tests that the results of the methods described will produce forms quite sufficient to illustrate the general anatomical principle of the evolution of tooth-forms from the primitive cones.

The methods will suggest to those who follow them out, particularly to post-graduate students, numerous points as to the mechanical genesis of tooth-forms.

The undergraduate may gain additional manual dexterity by manipulating the clay forms with spatulas until all of the sulci and fissures are outlined. When the clay is dry it may be readily carved by means of a knife-blade into accurate forms.

CORRESPONDENCE.

Letter from Dr. Greenlaw.

To the Editor of the Dental Cosmos.

Sir,—The very able editorial under title of "Plagiarism," in the November number of the Cosmos, citing a paper read by me

before the City Association of San Francisco as a pertinent illustration, calls for a word in my defence; though in spite of the facts given herewith, on my honor as a gentleman, I fear doubt will still exist in the minds of your readers.

The subject of the article is one in which, at best, a practitioner of my limited experience (fifteen years) could offer but few new ideas, and it was written on the spur of the moment to fill a gap caused by a member being too busy to prepare a paper. Though well aware of its imperfections from a literary standpoint, I allowed myself to be urged to present it, against my own judgment.

The ideas advanced were such as I had learned from various authorities; and in spite of the phraseology of my paper being almost identical with that of Dr. Thomas (as illustrated in the COSMOS), I can truthfully state that the November number of the COSMOS for 1891 had been securely nailed up in a packing-case in a store-room of my house, and the case has not been opened for over four years. I had no notes from this paper of Dr. Thomas, nor do I lay claim to a wonderful memory; hence it is as great a puzzle to me as to any one else how or why I made use of the language originally used by that great authority on anesthetics. More than this, I cannot recollect any such paper, but do not question the correctness of the editorial quotation.

The plagiarism, if such it must be called, was an innocent one, committed unknowingly and with perfectly honest and honorable intent. Such are the facts and such is my defence.

The paper as a literary effort I do not defend; but when one is doing his best in a line he regards as tending to the benefit of his profession and himself, it seems to me the criticism on the literary worth or worthlessness of the production was rather severe.

Very truly yours,

MAYO A. GREENLAW.

SAN FRANCISCO, CAL., Nov. 24, 1896.

PROCEEDINGS OF SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, October 20, 1896, at the New York Academy of Medicine, with the president, Dr. William Carr, in the chair.

The reading of the minutes of the previous meeting was passed until next month.

REPORT OF THE EXECUTIVE COMMITTEE.

Dr. WALKER. The Executive Committee report our first meeting for the fall and winter of '96-'97. A paper by Dr. George W. Weld, of New York City, entitled "Disinfectants and the Chemico-Metallic Method of Treating and Filling the Difficult Root-Canals of Semi-Devitalized Teeth." For the November meeting we will

have a very important clinic in the afternoon by Dr. M. H. Cryer, of Philadelphia, and in the evening Dr. Cryer will read a paper on the subject of oral surgery. In the afternoon he will demonstrate his improved surgical engine, which is far in advance of the one he has been using, and it will be the first time he has exhibited it at any clinic. Inasmuch as this society was organized in 1867, the Executive Committee thought that during the month of January it would be a good time to have an anniversary meeting. On that occasion we will have Dr. J. L. Williams, of London. The subject of his paper will be "Caries of Dental Enamel." It will be divided into two sections, and will be illustrated by seventy or eighty photo-micrographic lantern slides.

Dr. NORTHROP. I simply showed the method of using the Solila gold with which I am experimenting. I am not quite settled in my own mind about it, so I cannot give a definite opinion. There are many things that I like about it, but I am not so much in love with it that I would dispense with all other golds. In London, this summer, I met Dr. Williams and Dr. Croll, who use it almost exclusively. They say they save much time, and that the gold is very readily adapted to the walls of the cavity, and that they are very much in favor of it. As far as I am concerned, I am not able to say as much for it at present. I am much pleased with the experiments I have made thus far, but I am not willing to recommend it as a gold to be universally used in preference to foil. Dr. Jarvie has used it, and perhaps he will tell us about it.

Dr. JARVIE. I received a present of some of this gold from a friend in London, and I have filled several cavities with it. It is undoubtedly a valuable addition to the various forms of gold, but I am not prepared to say that I would adopt it to the exclusion of all other forms. It is somewhat of the character of sponge gold, only softer and more adaptable, and seems to have the property of the first pieces inserted remaining just where they are placed without any balling or rolling. Those who adopt the use of this preparation of gold with the idea of filling all classes of cavities with it and filling much more quickly and easily than with foil, will have many failures to mortify them, for I believe that it requires just as much time and just as much care to make a perfect plug with it as it does with foil, but with it a very beautiful and perfect plug can be made. For commencing a filling in a large open cavity it is invaluable.

Dr. BONWILL, of Philadelphia. Having received an invitation to your clinic and regular meeting for to-day, and as cataphoresis was the subject for to-night, I thought that it would be well to go back a few years and see what had been done without cataphoresis, by direct current. As far back as 1855 and 1856, in my experiments in trying to obtund sensitive bone, I used a galvanic battery and applied the same positive current as is used now, except without any anodyne, or cocain, or any of those preparations.

What led me to drop it was simply this: In one of the applications to a patient, whether I got the battery turned topsy-turvy or not I do not now know, but I produced a violent shock on my patient. If a man will only commence at the right point he will not

have so much trouble. If he will do as I have done for twenty years, cut out a cup-cavity instantaneously and put in lumps of gutta-percha until weeks' and months' separations are made and it can be taken out. You can cut out half a dozen cavities at one sitting, and the patient will thank you, and all by simply holding the breath for a minute at each cutting. Or, in other cases, rapid breathing for a minute and again, if needed, will overcome the exalted sensitiveness of the dentin. I never use an obtundent save a piece of blotting-paper soaked in carbolic acid, and place on sensitive dentin covered over by the gutta-percha, and allowed to remain for days, weeks, months, and sometimes years, and then, when I have the proper separation for plus-contouring I have no trouble about pain.

Dr. WATKINS. At the last meeting of the First District Dental Society I spoke of using eucaine by injection for the purpose of extracting teeth. This preparation is similar to cocain, only it is not dangerous, and is manufactured by E. Schering (chemist), Berlin, Germany. The question was asked me if I had used it for sensitive dentin. At that time I had not, but since then I have used it for obtunding sensitive dentin. I had a case the day after that meeting—a large cavity in the posterior surface of the second superior bicuspid, which took in the entire surface. It was a very sensitive cavity, in the mouth of a very intelligent gentleman, a lawyer in New York—and I should believe everything that man told me in regard to the pain he was suffering. He said the cavity was so very sensitive that he could barely have me touch it. I placed some of the eucaine in the cavity, the hydrochlorate, and wet it with glycerol, and allowed it to remain there four or five minutes and then excavated with little pain. He said the pain was greatly relieved, although there was still some sensation, but it was bearable. After filling that I prepared another cavity on the labio-cervical wall of the inferior cuspid, which you all know is an exceedingly sensitive place. There I had about the same result. It did not destroy all the pain, but it made it bearable, and wherever it was used it relieved the greater part of the pain. Since then I have used it in several cases in the same way, and in nearly all the cases with about the same result,—without totally destroying the pain, but making it very bearable.

I also spoke at that meeting about ammonol, which is one of the coal-tar preparations used for the purpose of reducing inflammation and allaying pain in cases of pericementitis. I want to tell you of one case since that meeting. It was a lower molar, where one canal had been filled several years ago with gutta-percha and a large amalgam filling put in on top of a piece of gutta-percha in the bottom of the cavity. The tooth was intensely sore when the lady came into my hands. I removed the filling, cleaned out the canal, which had not been cleaned out at all before, and also removed the filling from the other canal. I found it in a very bad condition, with a great deal of putrescent matter. I put a temporary stopping in the canal and cavity. The result of that was intense inflammation, a slight swelling of the gum, and a very sore tooth indeed.

I saw the patient on Sunday evening, which was about forty hours after the tooth had been worked upon, and found her in the condition just described. I administered to her ten grains of ammonol, with directions to take ten grains more at the end of an hour, and five grains at the end of each hour afterward, until the pain was relieved. She did so, and finally had it relieved sufficiently so she slept comfortably. The next day (Monday) she came to me again suffering, although the tooth was not quite as sore as it was on Sunday. I again administered the ammonol, giving her fifteen grains for the first dose, ten grains each for the following two doses, and instructions to take a five-grain dose each hour until relieved. To-day she was in my office about twelve o'clock, with all soreness gone, without having had anything else done to the tooth and without having it opened.

Incidents of Office Practice.

Dr. Walker. While I was on my vacation this summer, in one of the little cities outside of Paris, at the meeting of the French Dental Association, a gentleman presented at least half a dozen children, whose baby teeth he had been treating with a saturated solution of nitrate of silver, with this addition: After he had the cavity thoroughly dry he would rub the nitrate of silver in, and then fill the cavity with chlorid of sodium, rubbing it in with a wooden burnisher. He had been doing that for fifteen or sixteen years. I asked him why, and he said it formed an insoluble coating over the decayed part of the tooth. Other dentists there had been using the very same method. I speak of it because some of the dentists may try it. I have tried it since my return, and shall continue to do so. Dr. Michaels and some other eminent men in France have had great success with it. The salt formed a precipitate, chlorid of silver, which they claimed was insoluble.

Dr. Perry. I call attention to a partial denture made by Dr. E. C. Smith. I intended to ask his permission to exhibit it, but I failed to see him, so I venture to call your attention to it to-night. As you will see, it is a partial piece for the lower jaw, made with a stiff wire passing low down in front of the eight natural teeth, and clasping a bicuspid on each side. By this means there is no obstruction to the tongue back of the front teeth. It is used in the mouth of a lady for whom I do work on the natural teeth, while he does the artificial work for her. The lady told me it was made in this form at her request, and she has worn other pieces in the lower jaw made in the ordinary way, but this has proven much more satisfactory than anything she had before. The great advantage is that the tongue has perfect freedom at the back of the lower teeth. This was made as a reserve. She is wearing another similar one, and it is perfectly comfortable.

The President. Dr. Bonwill would like to speak on the subject of gold for filling teeth.

Dr. Bonwill. I felt particularly interested in coming here to-night, not only because of cataphoresis, but also on account of this new form of gold which Dr. Northrop, I presume, brought with

him from the other side this summer. There is always some new fad every little while, and I do not think there has been a greater fad than the number of preparations of gold for filling teeth since I have been in the profession of dentistry. I cannot understand how men engaged in dentistry, whether it is filling teeth with gold by hand or with any of the methods of malleting, can want anything else than Abbey's soft foil, and Abbey's cohesive foil, taking it as they make it and follow directions. Why should any one bring from the other side any preparation when we have a gold here which for forty years and more has stood as when it was introduced? There is one thing I believe I can do, I can fill a tooth with gold—an absolutely solid mass—with either one of the mallets I use or by hand pressure, and I am sure it has been proven to be absolutely solid and homogeneous throughout. I can do it with Abbey's foil, and with other foils, but what is the use of changing?

Dr. PERRY. I can second Dr. Bonwill's opinion of the value of Abbey's gold, but where will we be if we do not adopt new things? We would not have Dr. Bonwill's mechanical mallet if we had stuck to his electric mallet. I have never used the new Solila gold, which has been mentioned to-night, but at a glance I can see that it has an advantage in certain places. Let us use it in those cases without prejudice.

The paper of the evening, entitled "Disinfectants and the Chemico-Metallic Method of Treating and Filling the Difficult Root-Canals of Semi-Devitalized Teeth," was then read by Dr. George W. Weld.*

Discussion.

Dr. WATKINS. Did I understand Dr. Weld aright in saying that it is not necessary to have the broaches fill the pulp-canals; that the chemical action is such that whatever action goes on there is a something there that fills the canal and not the metal itself?

Dr. WELD. The action of the acid on the metal is very simple. It forms an oxid. You cannot insert the metal into the root of the tooth, nor can you have a sensitized metal come in contact with a strong acid without a generation of gas and the formation of an oxid. If the broach corresponds nearly in size to that of the canal, the oxid will fill any intervening space between the broach and the walls of the root. At the same time the oxid is formed, the acids acting upon the putrid matter will form the third compound, viz: the albuminoid, whilst the dead animal matter is coagulated. The compounds then are simply the three oxids, the oxid of tin, silver, and zinc, plus the albuminoid which is formed as I have stated.

The PRESIDENT. We shall be pleased to hear from Mr. Gane, a Fellow of the Society of Chemical Industry, who is with us this evening.

Mr. GANE. I did not come here with the intention of being called on to speak, but as you have done me the honor, there are two or three things I would like to say. I have not, unfortunately,

*For the paper in full, see page 20 of the current number.

any knowledge of dentistry, and therefore I may make some mistakes in the course of my remarks, which are made solely from a chemical standpoint. If so, I hope you will excuse me. In the first place, I would like to call attention to the experiments which Dr. Weld made on the action of strong acids on tooth-structure. As I observed it, he put in the strong acids teeth which had been extracted, and said there was no apparent action on them. He stated that on the strength of the acid depended the chemical action. That is true to some extent in the case of metals such as he mentioned. When you add zinc to certain strong acids, as sulfuric, there is apparently no action. In the case of nitric or hydrochloric acids, however, the action is very pronounced, because these acids cannot be obtained in a state of chemical purity. They contain water. I should imagine that a similar action would ensue when a tooth is added to hydrochloric, nitric, or nitro-muriatic acids, on account of the percentage of water which these acids contain. Dr. Weld said that when a tooth is placed in strong sulfuric acid the tooth is protected from the action on account of the coating of oxid which is formed on the tooth. That seems to me to be very doubtful. It is true that a coating would be formed on the outside which prevents further chemical action temporarily, but that coating is not oxid, and it must be formed by the destruction of the enamel of the tooth. The action of the sulfuric acid on the tooth would first be the formation of calcium sulfate, which must of necessity destroy a certain amount of enamel, and this action is largely increased if moisture be present. The conditions under which that experiment was performed would be different when performed on a dry tooth and on a tooth in the mouth. When a tooth is excavated we talk of drying the cavity by a current of hot air, etc.; but that is merely a technical expression, because a dry tooth is a chemical impossibility so long as the tooth is in the mouth. While we may for a moment dry the inside of a tooth, as soon as the hot-air blast or whatever we put in is taken away the tooth will become moist, owing to absorption of water from surrounding tissues, and any acid added to that tooth, no mater how strong, will of necessity act on that inside pulp.

There was another point to which I would like to call attention, and that was that when the tooth had been excavated, as I understand it, and this broach or needle is placed into the cavity and a drop of acid added to it, I understood Dr. Weld to say that a coating of oxid was formed on the broach, under the influence of the nitro-muriatic acid. From the appearance of the tooth which was passed around, and of the broach inside, I should say that the action was not so much on the broach as upon the tooth itself, and that the coating which you observed upon that broach was not due to the action of the acid on the metal, but rather to its action on the tooth, resulting in the formation of a nitrate or chlorid of calcium and magnesia, and you would have a tooth filled, not with oxids of the metals (as a matter of fact, if action did take place we should have nitrates or chlorids formed), but with nitrate or chlorid of calcium and magnesia. It is a well-known principle in chemistry that

an acid will act on the substance for which it has the most affinity, and nitrohydrochloric acid has a much greater affinity for magnesium and such substances as compose a tooth than it has for tin and silver.

Then, again, as to the action of nitro-hydrochloric acid on the putrescent matter in the tooth. Dr. Weld showed some experiments on putrefying organic matter. We know that any powerful acid, such as nitric, hydrochloric, or sulfuric, will destroy putrefying organic matter, but it is hardly necessary to employ such powerful acids, especially on such delicate structures as the inside of the mouth, when simpler substances, such as solution of chlorinated lime or hydrogen peroxid, will answer all the purposes without having such a destructive action as hydrochloric or any of the stronger acids. The action of nitro-hydrochloric acid on albuminous matter would hardly result, as stated by Dr. Weld, in the formation of an albuminate such as occurs when you add bichlorid of mercury to albuminous matter. The action of an acid on albumen would result in the splitting up of the albumen into other organic bodies of simpler constitution which would remain in the tooth, and might at some future date decompose and set up irritation in a tooth. I am not so well fitted to speak on this, however, as some of the gentlemen of your association. In conclusion, I must express my appreciation of the honor which you have done me in asking me to speak on this subject.*

Dr. Rhein. While the method, as presented by the author, is very fascinating, yet I think that from a practical standpoint it is rather weak. I was struck by the author's statement that he would consider any one an imbecile who had the presumption to claim that he treats teeth without having any abscesses resulting from such treatment. I have the presumption to say that in a record

* Experiments made subsequently to the above discussion have shown Dr. Weld's remarks on the action of strong acids on teeth to be incorrect. Teeth were immersed in strong sulfuric acid, chemically pure, and allowed to remain many hours. The experiments showed that at the end of three hours' immersion the whole of the exterior part of the teeth to a depth of 1-64 to 1-32 of an inch was disintegrated. In six hours the teeth were diminished in size one-half, and in forty-eight hours were almost totally destroyed. In the presence of moisture the destruction was much more rapid. Using the strongest obtainable nitric, hydrochloric, and nitro-hydrochloric acids, a similar result was obtained, but more rapidly. Experiments were also made on excavated teeth. A broach was placed in the cavity as directed by Dr. Weld, and one drop of the concentrated acids placed in the cavity. The broach of alloy was carefully weighed before and after the addition of the acid, and the coating described by Dr. Weld as a mixture of oxids of the metals of the broach was carefully analyzed. The weight of the broach remained constant, showing that the metal had not been acted on, while the coating, on analysis, was found to consist principally of calcium and magnesium phosphates, with small amounts of nitrate and chlorid and sulfate of these elements, according to the acid employed. These experiments were made with teeth which had been extracted for some time. Experiments were also made on teeth which were imbedded in fresh meat, so as to approximate to the conditions of natural teeth. A similar but more pronounced result was obtained, owing to the moisture absorbed by the teeth from the meat, which accelerated the chemical action. These experiments confirm my remarks at the meeting.—E. H. Gane.

dating back sixteen years, it would be difficult for me to find two cases of abscess due to any procedure in the routine of my office work. I say this because I have the record of all dental work that I have done, and I am able to substantiate that statement. I attribute this success, not to any particular method of mine, but rather to habits of carefulness, and the practice of absolute sterilization at all stages of my operations. If a pulp-canal or a pulpless tooth is treated with the properly sterilized instruments, and treated thoroughly, the production of an abscess is an impossibility. I am afraid that this method is very much of an *ignis fatuus,* in that it has a glamour on the surface which may lead us astray. I was interested until I heard the author state that part of the procedure includes leaving pulp-tissue in the canal, that no removal is contemplated, and that by this means the rapidity of the procedure is produced. This, to my mind, is the weak point. It is not the first time that such treatment of root-canals has been advocated. We have a similar method made famous by Professor Herbst, of Bremen. Dr. Schreier, of Vienna, introduced a most excellent chemical means of cleansing root-canals, but he made a lamentable error in an otherwise admirable method when he declared that it is unnecessary to remove the contents of pulp-canals, and that he simply disinfects them. It is this word "disinfect" to which I particularly desire to take exception. Disinfection of a pulp-canal will not leave that tooth in a safe condition, because it leaves a portion of the pulp-tissue in the canal. The doctor has formed, as he says, an albuminoid of that tissue, but this does not necessarily destroy the germs that may remain there. It may leave them in a state of inaction for years, as we may accomplish by the use of chlorid of zinc or cobalt,—similar to what we have seen years ago through the indiscriminate use of arsenic. We have seen such teeth quiescent for years, when suddenly the patients present themselves with an acute attack of alveolar abscess. Why? Because the chemical germ-resisting force lasted only for a limited time, and, as has been so ably said by Mr. Gane, in the mouth we have a condition of affairs which is entirely different from any surrounding experiments that may be made outside. We have a tooth which is subject to a circulation through the pericemental tissue. That is the great reason why no method which does not insist upon the removal of every portion of pulp-tissue can ever be successful. If the doctor can produce a metal which is a germicide, and which will destroy the germs absolutely, such a thing may be accomplished. He does not claim that this is a germicide. He gives it to us as a disinfectant. A method which leaves a tooth in such a condition that the fluid circulating through the pericemental tissues will have an opportunity to penetrate through the tubuli, is bound sooner or later to prove abortive.

Dr. NORTHROP. May I ask the last speaker to enlighten us a little further? He says he has never had any failures, and that he has a complete record of sixteen years. He tells us furthermore of some operators who have used cobalt, and after a lapse of sixteen to twenty years have had, as a consequence, an abscess. Why

would they not be justified in saying that they had had no failures? He gives them sixteen to twenty years, and he only dates back sixteen years.

Dr. RHEIN. It is very easy to enlighten Dr. Northrop. The point which the author raised is not one of subsequent abscesses. It was the production of abscesses in the treatment of a tooth as an immediate sequence. My remarks had no reference to the occurrence of abscess long after dismissal of the case. I referred to the length of time and the number of cases that I could quote without being able to find two cases of abscess resulting from my treatment. Sixteen years ago my method was entirely different from what it is now, but it embraced one principle, the absolute cleanliness of the canal and the absolute cleanliness of every detail of the operation; and I claim that any method that covers that principle is bound to succeed without the possibility of any abscess following the operation. I do not say that an abscess may not follow the treatment of a case of mine if I failed to fill it properly. If I should be compelled to leave any portions of pulp-tissue in any roots, I have not the slightest doubt that some of them may produce an abscess in later life.

Dr. NORTHROP. The doctor would not convey the idea that although the root might be thoroughly cleansed and filled accurately, that that tooth might not at some future time be the cause of an abscess?

Dr. RHEIN. No; I would not convey that idea. I am perfectly aware of possibility of disintegration from the outside of the tooth.

Dr. JARVIE. This is becoming rather interesting, because in my own practice I meet with quite a number of what are to me inaccessible root-canals. I am only too happy to learn that they do not exist in the practice and under the manipulation of some other dentists. Here is a chance for our clinical committee, because I, for one, would gladly attend a clinic given by any dentist who will have selected for him what are to some, like myself, inaccessible root-canals and clean those canals of all pulp-tissue. If we all could do as Dr. Rhein says he does, reach the extreme end of every pulp-canal and remove from it every particle of pulp-tissue, we would have no need of this process that Dr. Weld has presented to us to-night; but until we can all do what Dr. Rhein does I think such a process is exceedingly valuable, if it is correct from a chemical standpoint, and upon that point I am not competent to speak. In my own practice I have not only occasionally, but frequently, pulp-canals that are to me inaccessible. I have many of the anterior roots of lower molars, roots of superior first bicuspids, and the buccal roots of first upper molars in which I cannot go to the extreme end with broaches and cannot remove all the pulp-tissue from them. I hailed this process of Dr. Weld as one which would help me in this class of cases. By inserting one of these fine broaches of silver, tin, and zinc to as near the end as possible, and applying this acid, and so producing a substance that would be antiseptic for all time, I expected to be saved a great deal of trouble in the future that I had occasionally had in the past.

In my practice I have treated roots of teeth as thoroughly as my ability permitted, in which inflammation and abscess subsequently occurred. Such cases are the most trying of any we have to deal with, and sometimes cause great discomfort and pain to the patient, and are also a source of annoyance to the dentist. Now, if this process will prevent such cases occurring, it is certainly worth a trial. I have treated a few roots in the manner that has been described to us. How successful the result will be time alone will tell, but I think we are grateful to Dr. Weld for the time he has spent and the trouble he has been at in conducting his experiments, and for presenting the results of them to us this evening.

Dr. Bonwill. While I admire the effort of every one in trying to make an advance in dentistry, at the same time, when we come to the treatment of the dental pulp, its devitalization, its extirpation, and its after-treatment, I always feel like sitting down on that quarter from where the advance comes, and saying there are too many exposed pulps. Where a man keeps that watch on his patient that he can hold, then I feel that he is mistaken when he says he has had no success, having to fly from one practice to another. When he speaks of the conservative treatment of the pulp, then I say that man has had too many exposures. So far as this treatment of the essayist is concerned, it may be perfectly right, but there are other methods that have been followed for forty years equally so. If the living pulp is taken out or treated with arsenic and filled immediately, then there is no necessity for the loss of so many teeth, and but seldom should an abscess result nor but few pulps become exposed.

Dr. Weld. I expected Professor Elliott here this evening. He has made a study of this subject, and he would have been able to say much more from a chemical point than I am capable of doing. Dr. Morton was also to have been here. We tried two or three experiments with the Roentgen ray, and endeavored to get a shadowgraph such as he has illustrated in his new publication, which, by the way, is worthy the consideration of every dentist. Dr. Morton thought that the metallic broach being more opaque than the root of the tooth, the X ray would show the mechanical perfection of the method in the mouth. So far as the action of the sulfuric acid on metal is concerned, I think the chemist misunderstood me. What I said of the sulfate formed was in reference to the metal, not to the tooth. It was the viscidity of the fluid, or the question of solubility, which prevented its action on the lime-salts of the tooth. If you take a tooth and keep it in strong sulfuric acid for twenty-four hours, I do not think you will be able to find the lime-salts affected to any great degree. Of course, if you add water the result is different. As for the removal of the pulp, it seems to me I have been again misunderstood. I *always* remove the pulp in the pulp-chamber, but it is impossible to extirpate the pulp which is in the very long, hair-like canals,—say about three-quarters of an inch long. To be sure, I can put in certain kinds of acid and eat out the inside of a tooth in a very short time, but I do not care to do so. This method is only one of a number of other

methods. Dr. J. Foster Flagg, of Philadelphia, in an article read before the New Jersey State Dental Society last July, stated, if I remember correctly, that there were some seventeen different methods, such as filling with gold leaf, tin, cements, amalgams, wooden pins, etc. So far as my experience has been, I can do with this method what I cannot do with any other. It would have been a physical impossibility for me to fill the roots which I filled this afternoon by any other known method. This method presupposes no loss of tooth-substance, but if there is an infinitesimal amount of the lime-salts dissolved, it is so small that it is hardly worth mentioning. But admitting that there is a slight loss of lime-salts, then the result is a basic carbonate or a basic phosphate, probably the latter.

In reference to "inaccessible cavities," I used the word "inaccessible" in a restrictive sense,—in fact, I quote it in my paper. It is a word one can take exception to, but I do not know of any other to fill its place. They are not inaccessible; if they were, we could not get at them at all; but they are partially so. It is hard to fill them or introduce medicated cotton or anything else into them. As far as permanency of asepsis is concerned, you know as much as I do about it. One gentleman here this evening has three teeth which have been filled eleven months and given no trouble. Of course we cannot be sure that they will remain absolutely permanent. There is nothing certain in this mundane sphere—except death, taxes, and perhaps a few other things. I do not put this forward as the only method, but simply state what I can do and what I cannot do without it.

So far as the liability of having abscessed roots after treatment is concerned, all I can say is I know I have had them myself, and I have tried to be as careful in my treatment as possible. I have heard dentists say that they never had failures; it was only the *statement* made which I referred to in my paper as being on a par with imbecility.

Adjournment.

JOHN I. HART, D.D.S.,
Editor Odontological Society.

PENNSYLVANIA STATE DENTAL SOCIETY.

(Continued from page 925, vol. xxxviii.)

FIRST DAY—*Afternoon Session* (Continued).

DR. H. C. REGISTER, of Philadelphia, read the following paper:

PHYSIOLOGICAL CURE OF DENTAL CARIES FROM CLINICAL OBSERVATION.

It is written of the great apostle St. Paul, in describing his visit to the "City of the Violet Crown," this remarkable historic note: "For all the Athenians and strangers that were there spent their time in doing nothing else but either to tell or to learn some

new thing." This historic contribution by the great apostle of the Gentiles gives a scientific character to his visit.

From the days of Hunter till the present time the mysteries surrounding the development of the dental tissues have enlisted the talents of the most acute observers, in their attempt to unravel the formative influences of tooth-development and their subsequent disease, "caries," to which they so generally fall a victim under the conditions of modern civilization. While investigators are tending to show that the laws governing the formation of dental tissues are the same as those which control and maintain all the tissues of the body, yet the explanation of certain phenomena of physiological action, so apparent from the standpoint of clinical observation, has not been fully made plain.

Dr. Black, in his recent investigations as to density, percentage of lime-salts, strength, etc., occurring in the human teeth, has caused the displacement of the rudder in the dental ship while under full sail, and many of us are flopping in the wind and may drift upon the rocks of professional disaster if we let go the sheet altogether, and base our practice upon the theory that a formed tooth, as first erupted, will accept a gold filling of the higher specific gravity as readily as it will in later life. And yet his experiments are conclusive as far as they go, and must stand as demonstrated facts.

Dr. Truman says of Dr. Black's great work, "Any attempt to express for or against the work of any one, when this has been based on actual investigation, would not only be valueless, but the height of folly;" and, continuing, "Viewed in any light, the labor of this very able worker in untrodden fields must be held to be most painstaking and thorough;" observing, however, "The controversy between 'soft teeth' and 'dense teeth' has not been settled by these investigations."

The color of the teeth, heretofore serving as a guide in determining their structural density and liability to carious attack, is set aside as fallacious, as shown by Dr. Black's tables, as he found in the percentage of lime-salts in all teeth so slight a variation that it ceases to be the conditional cause why some teeth decay rapidly and others do not. He particularly calls attention "to the immediate practical value of the general habit of the profession to regard teeth that are seen to be decaying rapidly as soft teeth, teeth that are poorly calcified and will eventually be lost on account of their poor quality, to be erroneous, it being a demonstrated error that teeth which decay rapidly are as well calcified, strong, and dense as teeth in which no decay appears; it being emphatically not a difference of the percentage of calcium salts in teeth which constitutes the basis of the difference of their susceptibility to caries;" going on to say that teeth which decay rapidly are sufficiently hard for any kind of filling-operations, demanding the highest and best judgment in mechanical treatment instead of substituting something that is easily done.

From clinical observation, Dr. Black is undoubtedly correct in regard to color having no weight in indicating variations in struc-

ture; lime-salts, with water and pigment, probably giving an animated expression. The color and shade being a unit in the harmony of temperament, temperament and color, clinically, make no distinction in liability to caries. The simple question involved is, Are young teeth as well served by dense gold fillings as by those of less specific gravity, depending upon adaptation, or, in other words, protection until the hardening process is perfected, which we find to be so potent and manifest from clinical observation, it being the essential means and object sought for in the physiological cure for caries.

Dr. Black, in his recent experiments, finds that man, living upon "natural food, would be able to close his jaws with a force of three hundred pounds, whereas in a civilized state and depending upon artificial preparation of foods, the amount of stress that would be borne by the individual tooth without severe pain or injury is reduced to one hundred pounds or less in a state of apparent health." This condition is undoubtedly in harmony with clinical observation, as noted in bringing into use teeth that have been disarticulated for a time,—how little pressure will produce pain in the peridental membrane; and in an inverse way, how the undue pressure upon carrying one end of a bridge will cause absorption of the root.

Dr. Black admits that these investigations do not clear up the mystery which still prevents an explanation of the reason "why some people are very susceptible to caries, others less so, and still others immune;" but they do clear up a grave misconception as to the influence of differences in the per cent. of basic matter as a factor in caries; for heretofore it has been thought, in the dental profession, that the relative susceptibility of tooth-structure to caries was attributable to these differences in the percentages of lime-salts they contain. Now we know this to be fallacious.

These surprises to the profession are continued in connection with Dr. Williams's recent investigations on the formation of enamel, in which he treats that part of the tooth as a petrified dermal appendage, absolutely lifeless and unchangeable, in contradistinction to the theory of its being a connective-tissue product related in some way with continued life-stimulus. He says, "Enamel is a solid mineral substance, and the finest lenses reveal not the slightest difference between the enamel ground moist from a living tooth and that which has laid in the earth a hundred centuries." If this be absolutely true, accepting that the filtration of water from the dentin has no influence upon enamel in holding nutrient matter, it must influence us in our work. This, with Miller's great work in showing the active cause of caries to be local, does not wholly explain the predisposition to points of attack where no local factor resides, also the coincidence of teeth decaying on opposite sides of the mouth in exactly the same positions, both being ripe questions which cannot be ignored.

These conditions and the deductions drawn from clinical observations point to some constitutional influence, as Dr. Gerhart so suggestively pointed out in his strong paper read last year, that

"The etiology of caries has its conception in the negative fact which obtains as a consequence of diminished touch, resulting from changed environment brought about by a change in the physical characteristics of food, this condition exercising an influence by diminishing the activity of the physiological process which gave the previous deterrent power to the dental tissues."

Local conditions do not explain the facts. Temperamental conditions show no variation in the susceptibility to attacks, predisposition, or the susceptibility of tissues obviously being underlaid by some constitutional dyscrasia that leads to a local lesion by permitting micro-organisms to find a proper habitat and bring about tooth-destruction.

Dr. Williams says, "The teeth which contain little or no organic matter often decay rapidly. The teeth of many animals and fishes containing a large proportion of organic matter rarely or never decay, which indicates that the presence or non-presence of organic matter is not an important factor in the phenomena of dental caries."

The investigations of Drs. Miller and Black on the subject must be ranked as the most important ever made. Dr. Williams, however, accepts the liability of the human teeth to caries as absolutely due to environing conditions and not to inherent structure, saying "that no tooth will decay if its environment be healthy, and no tooth can resist decay if its environment be 'unhealthy,'—unhealthy meaning such particular external conditions as are inimical to the preservation of the tooth." This does not hold good absolutely, clinically, and he falls back upon the assertion that it would be going too far to claim that tooth-structure had no relation to caries; "but even such a statement would be nearer the truth than the position occupied to-day by a large majority of the dental profession."

Are we not applying in methods of practice much that is drawn from clinical deductions that cannot be reasoned out, and yet appears to be correct? Just as Robertson inferred from observation, half a century before the science of "bacteriology" existed, that the active cause of caries was an acid; as scientifically shown by Miller in his great work that micro-organisms are the active agents in forming an acid. Acid alone does not produce caries, though it may enter largely into erosions and gouty conditions, which, however, have no place in this paper.

No less surprising are Dr. Black's experiments with gold, showing the teeth are always harder than gold can be made; and while he lays much stress upon the physical or cohesive properties in making fillings dense and hard, adaptation takes precedence of all else, for he says, "no matter what the density or strength, in performing the operation this must be the first count," which is borne out by clinical observation.

Dr. Custer has found cohesion to be developed at a much lower degree of heat than is generally supposed, saying it may be so low that gold may be subjected to it for days without injury and still be highly cohesive.

From clinical observation, teeth are saved or lost under gold manipulation in degree as the physical property of gold is appreciated. In an indiscriminate selection of fillings performed by myself and taken from chart records, carefully kept since 1883, I find the following results:

		Average.	Longest Service.	Doing Service.
Gold,	335 fillings	7.73 yrs.	12 yrs. 10 mo.	178
Globe alloy,	176 "	5.18 "	12 " 7 "	10
Rogers' alloy,	126 "	4.9 "	10 " 5 "	2
Welsh alloy,	151 "	4.5 "	11 " 9 "	18
Gutta-Percha,	173 "	3.07 "	10 " 3 "	46
Phosphate zinc,	182 "	2.8 "	12 " 3 "	50

This collection of figures representing the life of these fillings, if added to those doing service, would probably make the gold fillings average nine years, alloy eight years, and gutta-percha and phosphate of zinc three years. It is presented to show the transient influence of fillings generally. While gold stands at the head of the list, and though considering it the best material for filling teeth where indicated, there are so many different methods in its use that it really remains an open question.

It had been my intention, in preparing this paper, to show by tabulated records how the several materials generally used for filling teeth differed in causing secondary dentin to form under a filling through influence of manipulating the material; but the investigation of the charted record was taken up too late, it proving to be a much larger work than was at first supposed. This short table is not intended to show that any one material is better than another; but it had been my intention to see what difference, if any, existed between these, which are the result of methods usually pursued, and those I have made general in my practice during the last half-decade.

Discussion.

Dr. C. N. Peirce. The paper shows evidence of work, and it is always interesting to have statistics. Nothing adds more to the value of a paper than the observations made by one who can generalize them in so short a paper as we had to-day.

In regard to gold fillings, we must remember that they are placed in the best teeth and teeth that have been least affected with caries; while amalgam fillings, as a usual thing, are placed in teeth that most need filling and are less durable. The statement that a gold filling is more durable than amalgam would hardly give us a true estimate of the value of gold over amalgam. We would have to have the relative durability of the teeth, independent of any filling, in order to get at a correct estimate of the value of the material used. We might take zinc phosphate and place it in some cavities, and it would have more saving qualities than any other material and yet be temporary in its results, while gold in the same cavity would have no value whatever.

It is hard to make a just estimate of the value of different materials unless we present, at the same time, a true statement regarding the durability of the teeth.

I think the line of thought and of record is an admirable one, and I hope Dr. Register's observations will be pursued still further. He has made, as we all know, very careful experiments in the methods of filling teeth, and has a valuable record which I hope at some future time we shall have regarding the durability of fillings and the material used. I want to congratulate him on his work thus far, and trust he will persevere in it and that we may all have the benefit of it.

Dr. R. Huey. Dr. Peirce made one statement that touches the keynote when he said that a phosphate filling in a certain tooth may be a saving filling, while gold in the same tooth may be of no service whatever. As I understand Dr. Black's paper, he claims that teeth are always of the same density, and that teeth may be always filled with gold with practically the same result. It certainly has not been my experience. There are many teeth, I find, where gold is utterly valueless, and in such cases the plastics will for many years bridge over that case. I don't like to dispute a statement coming from Dr. Black, but I know of many cases where teeth have been filled with gold and other teeth in the same mouth filled with plastics, and the plastics preserved the teeth and the gold had to be taken out and plastics inserted.

Dr. H. Gerhart. Forty-three years ago I was called upon to fill a tooth for a young lady fourteen years of age. I filled for her all the teeth I thought were worth gold fillings with gold, and I filled all the others that I thought were not worth filling with gold with tin foil. Two or three years after that she came again to see me, and there was not a gold filling in the mouth that was not imperfect. Some cases, one especially I remember, and with sickness of soul, where the filling was in position and there was a ring of decay around it so that when it was touched the whole thing rolled out together; and so with all the other gold fillings in the mouth. There was not one that was worth a straw; and yet the tin-foil fillings put in at the same time were in just as good condition, so far as I could see, as when they were put in.

At the same time I filled several front teeth with gold for a young man in Philadelphia. He happened to be in my town. A few months ago he died, and these gold fillings were as good, apparently, last winter as when I saw them forty-three years ago. Now, then, it would be scarcely fair to say there was greater skill in one case than in the other, because, as far as I can remember, I gave them equal attention. I was very much interested in them, and I gave them both the same care and all the skill in me, and yet here were two cases where they were nearly the same, though one was perhaps five or six years older than the other; here were two cases where in one the result was just the reverse of the other.

Now, there must be some reason for that. If any one should ask me which I thought had the better teeth, I should say the young man, because they were the only teeth that had decayed, whereas the young lady had a great many decayed. The explanation as to why the tin-foil fillings, which were put in under adverse

circumstances, lasted so much longer than gold was that there must have been something in the tin foil that had an affinity for the teeth and for the elements that formed the dentin, by which some compound was formed, or else it must have been in the adaptation.

Dr. S. H. Guilford. I simply want to allude to one thing in regard to Dr. Register's paper, and that is to commend the care with which he has made his record. He very kindly showed me some time ago, at his own office, his method of recording operations and the notes he made, and they were certainly very complete. I think he is to be commended especially for this, because it is very difficult nowadays for a busy man to take time to either make the record himself or to give to his clerk facts in regard to cases so that they will be properly recorded. Dr. Register's method is very systematic, full, and complete, and if we imitated him I think it would result in great good in many ways. The average practitioner of to-day, it seems to me, is satisfied when he has done his work in a way satisfactory to him and to his patients, and seems to rest content with that satisfaction, apparently forgetting, as many of us do, that we owe a duty to our fellow-practitioners. We ought to make a history; we should at least record our facts and observations in such a way as to make them available, and they can only be got at by keeping a record properly systematized.

Dr. Beck. I would like to relate the case of a young man who had been under my care since he had teeth, almost. Every member of the family except this young man had a very fine denture, but he was unfortunate in having a very poor one. I have tried gold and failed; have tried phosphates and failed; and now they are being filled with amalgam, and it has proven a success in his case.

Dr. W. F. Litch. In regard to Dr. Black, I am not quite prepared to accept his statement that in the analysis of the constituents of teeth, hard or soft, as he designates them, substantially the same results are given. There is a dynamic difference in the qualities of teeth, just as in the quality of any other tissue. If you examine muscular fiber or two muscular fibers, I presume they would yield substantially the same result as to chemical analyses, but one might be weak and flabby and one firm and resilient. There is a vital quality in it; some peculiarity of the length of fiber, or something beyond the skill of the chemist to determine. Every practical dentist recognizes this difference in the quality of the teeth: that in putting the excavator in one tooth it crumbles as chalk, with no cohesive properties whatever; others are flint-like in texture. Undoubtedly both would yield the same results on chemical analysis; but when it comes to this vital, resistant quality they are widely divergent. One class is soft and entirely unfitted for the chemical forces which come into play where gold is placed in contact with such soft tooth-structure, entirely unfitted to resist the mechanical impact necessary to the introduction of a gold filling, yet it may be preserved with gutta-

percha or tin; whereas if the teeth are flint-like they will stand for years and indefinitely under a well-placed and impacted gold filling.

These results of actual clinical practice are of far more value to us as guides in our practice than simple analyses of the constituents of the tooth-structure.

Dr. REGISTER. I should like very much to have made the list of the average life of fillings a little more extensive, but I was unable to do so on account of it requiring a great amount of detailed work. My desire was to try to show from clinical observations that there is something we are dealing with constantly in our every-day practice that is in evidence all the time, that is not explained away by the theories of physiologists and bacteriologists, up to the present time.

In regard to many of the alloys in use at the present day, I also wanted to show that the recent investigations that have been made by Dr. Burchard and also by Dr. Black have shown that there are certain compounds which go to make up alloys that expand and contract, and by the addition of a small amount of copper we get an alloy which will neither shrink nor expand, at the same time be of such density as to give us the best results.

With regard to gold, as referred to by Dr. Gerhart, he did not tell us whether his fillings were done with soft gold or cohesive gold. Tin is soft, and undoubtedly there is something about it that may have power as an antiseptic, which exerts an influence; but the inferences I have drawn from its use are that there is something in the operation of filling teeth,—using the filling as a means,—which permits the dentin to calcify itself.

Dr. GERHART, answering the question of Dr. Register, said, In those days, so far back, nothing was known as cohesive gold, except sometimes it happened to the manufacturers as a calamity.

A paper was then read by Dr. A. S. CONDIT, of Findlay, Ohio, entitled,—

COMBINATION PLATE- AND BRIDGE-WORK.

In preparing this paper for your consideration, I feel that it would be trespassing upon valuable time to make much mention of the fundamental principles relative to the construction of artificial teeth. Every good workman knows that the health and strength of the remaining natural teeth and the conditions of their surroundings are the most important considerations. After a careful examination we should be able to decide upon the applicability of the different systems of work in respect to usefulness, appearance, durability, and comfort. This necessarily requires a familiarity with all classes of work. If this thorough knowledge were possessed, we would never use a fixed bridge whose abutments would not be sufficiently strong to offer the needed resistance, either because of a lack of firmness or too long a span. Neither would we use a plate attached by a clasp to the natural teeth when the friction caused by the lateral motion in mastica-

tion would tend to loosen the teeth clasped, so that in time they would give way.

Admitting that the teeth used for the supports of a fixed bridge will give way if overworked, and the well-known evils resulting from the use of a plate, especially if retained by a clasp, is it not reasonable to suppose that if the teeth adjacent to the space to be filled with the artificial denture were first crowned or banded to prevent wear or decay, and attachments were placed thereon and a plate made to rest both upon the teeth and gums, receiving an equal support from both, that we would reach nature's demands in a better manner than in any other way? If a workman attempts to make any one method meet all cases, is not failure the inevitable result? Fixed bridge-work, the ordinary plate, the portable bridge, all have their place in dentistry. We must discriminate between them, and use the right one in the right place, making our work an individual operation adapted to each case, which will insure higher results and the greater good to patients.

All workmen will not take this unprejudiced view of work. One capable workman says, I have inserted two full upper portable bridges that are giving perfect satisfaction, in one of the cases the third molars being the only support. Another says that if all removable bridges are not failures it is not the fault of the construction, but due to the favoring of the appliance on the part of the person wearing the denture or to the absence of occluding teeth.

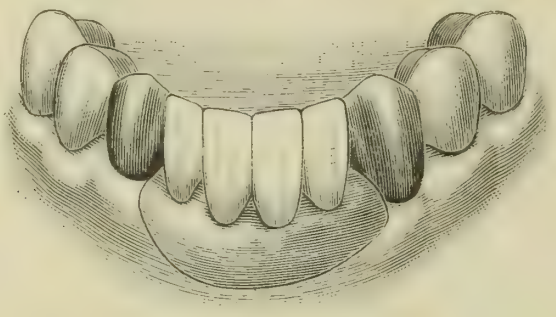
A few weeks ago it was my privilege to examine a full upper denture without any plate covering the palate and with but one support. It had been worn for four years, and, as far as I could see, was perfectly satisfactory. The same person was wearing a full lower denture with two supports, and it was as firm as fixed bridge-work. I could mention many similar cases.

It is generally agreed that the two most commendable features of fixed bridge-work are firmness and the retention of their supports in their proper relative positions; but firmness is obtained at the expense of the elasticity which is characteristic of the natural organs, and especially the teeth. This is not so in removable work, as there is a yielding of the denture proportionate to the texture of the subjacent tissue.

In combining the plate and bridge, we get most of the good qualities of each class of work without the strong objections that each possesses when used alone. The pressure is divided and distributed between the attachment teeth and the subjacent tissue. The work is held firmly, and the attachment teeth are held in their normal positions. The space which in bridge-work is left for cleansing is filled up. The work can be removed and replaced at the pleasure of the wearer, and when the denture is removed both the work and the mouth can be thoroughly cleansed. One notable advantage of this class of work for the upper jaw is that the surface of the plate which rests upon the gums need only be wide enough to cover the ridge, and thus avoid the common interference of artificial dentures with taste and speech.

For holding the combination plate and bridge-work in place I have devised an attachment. It consists of an open gold clasp tube, 26 gauge, which is soldered to the crown; also another tele-

FIG. 1.



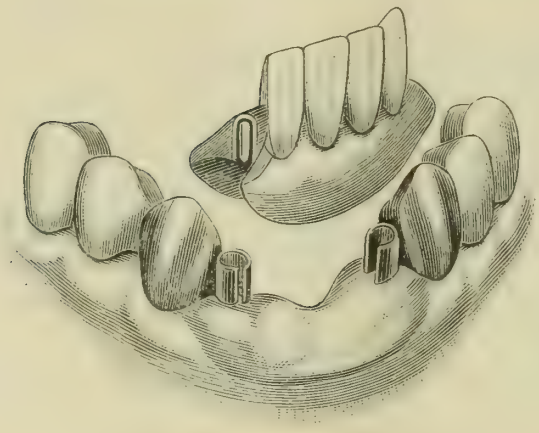
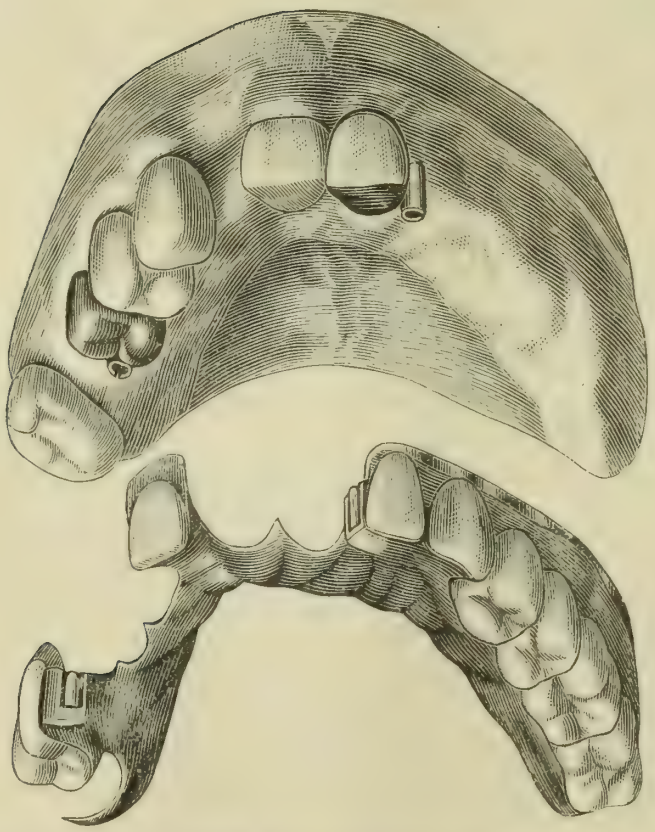


FIG. 2.



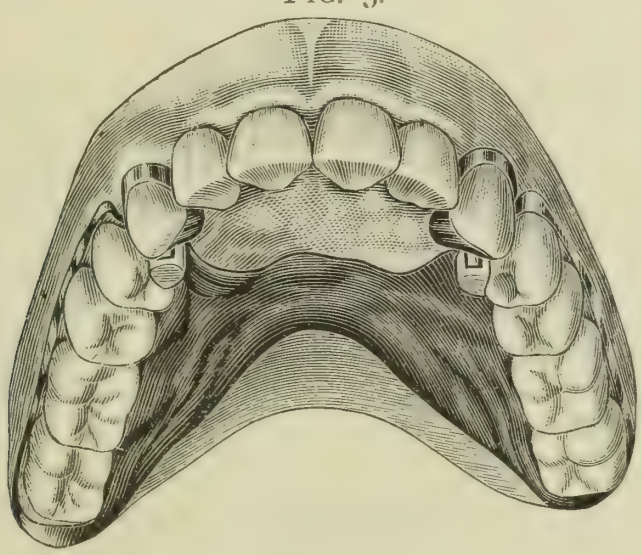
scoping tube which is called the shield, closed at one end, with a round, tapering pin in the center, a trifle larger than the tube; and a V-shaped metal strip on the side of the telescoping tube, which I have named the ear.

A correct understanding of the construction of the attachment and the principle of its workings is quite important. As the pin passes into the tube, which is a trifle smaller, it embraces the pin with a tension proportionate to the spring. The outside telescoping tube fitting closely on both sides of the inner tube prevents any rotation, while also shielding the pin. The ear is for the purpose of giving a firmer hold into the plate, but it is not used for metal or continuous-gum work.

The attachments are uniform in size, and interchangeable. They are sufficiently long for any case, but in close bites it will be necessary to shorten the attachment to correspond with the articulation. If there should be unequal absorption of the ridge, which might occur in a one-attachment case, the tube may be shortened and the work brought as close to the ridge as desired.

I have also devised an implement called the guide, which is used in setting the tubes in a two-attachment case, vertical and parallel with each other. Any dentist who can make a crown will experi-

Fig. 3.



ence no difficulty in making the work. In places where but one attachment is used, as in substituting the lower molars, much will depend upon the shape and texture of the ridge; for if the ridge were flat and the gums soft and spongy, the liability to induce strain upon the attachment tooth would be increased; but if the ridge is high and the gums hard, but little, if any, strain will be brought to bear upon the attachment tooth. I have several practical cases now in use that seem to be as serviceable as a fixed bridge with second bicuspids and molars, with a single attachment to the lower first bicuspid.

The success of such cases depends largely upon the support given by the alveolar ridge. As the contact of the work with the ridge is controlled by the attachment, which can be adjusted to suit the case, there is not that undue absorption of the gums that occurs when the work is held in place by a clasp.

I consider this method especially adapted in substituting the lower incisors, as shown in Fig. 1. The principal advantages arising from using this method in this case are that the cuspids are

held firmly in place, no undue strain is placed upon the gums, and the work can be removed and thoroughly cleansed. If fixed bridge-work were used it would be difficult to adjust, on account of the leaning condition of the cuspids.

Every workman knows how unsatisfactory a plate is, in the work of mastication, where none but the six anterior teeth remain, especially if there is but little ridge. My plan of constructing such a case is to band or crown the cuspids and couple them together back of the front teeth with a heavy iridio-platinum bar, the same as in making an ordinary plate.

I have found this method of attachment fully as useful for many places in the upper jaw as in the lower, especially if the teeth are all gone on one side and not on the other. Fig. 2 represents a practical case which has been in use for over two years.

When none but the six upper anterior teeth remain, I would suggest having the work constructed as shown in Fig. 3, and thus avoid covering the entire palate. In the work of substituting the artificial for the natural, if but one tooth remains on opposite sides of the jaw this work is especially indicated.

Discussion.

Dr. Beck. It occurs to me, when this attachment is in position, when the occluding teeth bring pressure to bear upon it, that it will produce a leverage and that leverage would have a tendency to keep up a constant irritation of the root, which would finally result in its loss. I have attempted with one or two teeth to attach in that way, and in one case set up such a state of irritation that I had to cut them off in order to relieve the root of the bicuspid and retain it.

Dr. I. N. Broomell. The essayist has, I think, covered the whole ground when he said that it depends considerably upon the condition of the ridge. If the ridge were a rigid or hard one, it would certainly be much more serviceable. Further than that, I can't see why the attachments could not be made with one crown fitting over another crown instead of having a lug. By making this partial band a perfect cylinder, and fitting an additional cylinder over it, I should think you would have much more strength. In the upper jaw, where the hard palate serves as a support, the conditions are much more favorable to success.

Dr. Register. I attended a convention of the Western Ohio dentists last winter, and had the pleasure of listening to the paper there and of hearing the explanation of the apparatus.

I have been impressed on several occasions with the belief that something of the kind described by the essayist was a necessity, especially in cases where the molars, or perhaps the bicuspids, were gone, and where the front teeth were intact. I have in one instance started or attempted to make an artificial denture to fit a case of that character. I did not carry it out, from the fact that I had in some way missed the connecting link in the process of carrying the operation from the ferrule to the tooth-structure, but

I can say that my enthusiasm in regard to the apparatus is not lessened in the least.

I talked with a gentleman yesterday from Pittsburg who has done a number of these cases within the last year, I believe, and he says they work beautifully; that there is no irritation; that there is no trouble at all, and no disposition to become loose. If they should become loose, it would take but a moment to tighten them.

In connection with a countersunk crown where very little power is used, this certainly would present a beautiful piece of prosthetic work.

Dr. LITCH. My only experience with this type of denture was a great many years ago. A gentleman had occasion to have three or four teeth replaced,—I don't remember the exact number. His mouth was very flat, and he found himself entirely unable to wear the ordinary suction plate. I conceived the idea of capping the incisors, swaging a partial upper plate, and soldering the plate to the caps. The ultimate result was, the strain on the anchorages resulted in the loosening of the incisors, and the denture then became worthless.

Time proves all things, and unless I am vastly mistaken, the mechanical principles involved in this process will lead to ultimate failure. It must result in the loosening of the anchorages or of the teeth, at least, because the pressure falling on the gum for a time saving the anchorage, the absorption of the gum will ensue. I could hardly hope permanent success from this kind of appliance, although I don't doubt in many instances it would be useful and satisfactory for many years. It is certainly an excellent way of steadying the piece, although at the ultimate sacrifice of the tooth, and it would be a question when that would be advisable under the circumstances surrounding each case.

Dr. W. H. HAINES, of Allegheny, stated that he had in the last four or five months put on a number of these cases, and they have proven very satisfactory so far, and he was well pleased with them. The patients also reported themselves as being well pleased.

Dr. GEORGE R. CHILD. I have had some little experience with this kind of work during the last six months, and the results so far have been very satisfactory indeed. What the ultimate results will be—whether the teeth will become loosened or not—remains to be seen. Of course there is a possibility of that happening; but that same thing may happen with fixed bridges, and this, as I understand it, does not come in competition with fixed bridges. There are some cases in which you can use the removable bridge, and no other kind of bridge can be used; for instance, in some of these cases, with molar on one side and bicuspid on the other, a full denture can be constructed with those abutments.

Dr. KOSER. I have had some experience with shell crowns on fixed bridges, and although satisfactory for six months or two years, after being worn four or five years the metal will expand and become loose, or the cement disintegrates or decays, and in some instances you almost have to encircle the whole tooth by a large filling.

Dr. McQuillen. I should think the way to avoid the trouble the gentleman last referred to would be keeping the work carefully examined, and resetting the piece when necessary. A case of that kind, if it stands two years, and then has to be reset, is certainly a success.

Dr. Libbey. I have had a little experience with the Condit method. It is in some cases an exceedingly practical thing; but to use those anchorages with the idea that the teeth have to support the bridge is a mistake. Their purpose is to steady it in position, which it will do very nicely, depending on the ridge for support for mastication. With an appliance of that character, where you have any leverage at all, in time, I am satisfied, the roots will give out; but in nearly every case the anchorage should be used merely to steady the plate in position. When thus used, it is superior to any other sort of attachment; but to depend on it as for abutments to a bridge, I don't consider it practical.

(To be continued.)

Annual Convention of the Sixth, Seventh, and Eighth District Dental Societies of the State of New York.

(Continued from page 1032, vol. xxxviii.)

Second Day—*Afternoon Session* (Continued).

William H. Shaw, Esq., of Rochester, read a paper, of which an abstract follows, entitled:

Dental Jurisprudence.

Dental jurisprudence may be defined as that science which teaches the application of every branch of dentistry to the purposes of the law. In the discussion of this subject, we must look at it from two points of view, namely, the duties and requirements that the dentist owes to the public, and, on the other hand, the duties and requirements the public owes to the dentist.

One of the most important and also interesting subjects in the relation of law to dentistry is the legal protection afforded the dentist and regularly licensed practitioners by the degree of D.D.S. There are two phases of this subject which deserve special attention: the legal right of the dental practitioner to perform any and all operations within the limits or domain of dentistry, and the legal right to administer remedies systemically.

In the first place, the dentist must be competent to perform any operation, treat any disease or pathological condition pertaining to the dental organs, and adopt and practice such systemic treatments as are promulgated by the body of the profession.

A dentist is licensed to perform any and all operations within the domain of dental surgery, providing, of course, he complies with all the laws and enactments regulating the practice of dentistry in the state and county within which he resides. The law expects and demands that he be possessed of an average amount of skill and knowledge of his profession; if he lacks that, or neglects to use

it judiciously in the treatment of a case or in a surgical operation, he is liable for malpractice, if serious results follow any operation he may perform.

However, the dentist cannot experiment to the injury of a patient without liability to damages for the same. But a dentist, in performing an operation or treating a case, whatever its nature, may have a new method of treatment or operation suggest itself to him. It may be only a deviation from or improvement on the old method. However, if he has good reasons and could prove that it possessed advantages over the old method, he is privileged to practice the same; or, when such operations become popular and accepted by the body of the profession as practical and beneficial to mankind, then, and only then, is he, according to the accepted views of the courts, licensed to perform them.

When a dentist is called as an expert he ought to receive extra fees for his services, for he is expected to interpret any difficult dento-legal question that may arise, and be prepared to adapt his knowledge and experience to the proper explanation of any questions of facts submitted to him, to enable the jury to arrive at a just conclusion; all of which requires special study and training, and many times proves to be the turning point in a closely-contested case.

The line between expert and non-expert witnesses is not always clearly distinguishable. As a general rule, non-experts are confined to a mere statement of facts, while experts may give their opinions based upon a statement of facts, or upon a hypothetical question.

The law has become settled that a dentist has the right to administer anesthetics, where in an operation he can mitigate or lessen the pain; but note carefully the restrictions placed upon a dentist in this regard: the skill demanded of him is held to include all the known rules the experience and wisdom of the profession have discovered and advocated. He must thoroughly understand all of the practical details of the operation, which the court would hold to constitute only ordinary skill.

If he can prove that he thoroughly understands the modes of administration of anesthetics, precautions to be observed, etc., he is not liable for adverse results if he applied his knowledge to the case at issue.

If a dentist should administer an anesthetic and the patient die, he must notify the coroner, as he cannot issue a death certificate himself.

There seems to have been much discussion with reference to the legal right of a dentist to treat cases by internal medication. Some cases positively require it, and the dentist might be held liable for the failure to so prescribe when failure can be attributed to this negligence or want of skill and knowledge; he should not prescribe remedies unless he is thoroughly conversant with their effects and the proper mode of administering them.

In the use of cocain as an anesthetic, the greatest precautions should be observed. In the first place, the authorities of the United

States and abroad are divided as regards its merits, and should an accident happen to a patient, the dentist might have to show that he possessed at least a fair working knowledge of it in all its phases, and he should adopt and pursue the modes of administration advocated by the leading authorities on the subject; the drug should never be used unless restoratives applicable to the several complications which might arise are conveniently at hand.

A dentist, before administering an anesthetic, must learn the physical condition of his patient, whether he suffers from heart or any other organic disease; or if incapable to make such examination, he must insist upon a doctor's certificate that the patient is in fit physical condition to inhale an anesthetic. This is the only safe way for a dentist to protect himself against an accident caused by some organic trouble which might occur during or after anesthesia, and a jury might show a dentist no mercy if it could be proven that he did not observe such precautions. As the circumstances of each case are different, each case must be its own criterion, and is decided by the jury according to the evidence.

With reference to the use of a local anesthetic, one point is worthy of special notice. We have already seen that you are required to know the condition of your patient for the administering of an anesthetic; you should also know what combination you are giving, and the amount of each ingredient, as one patient will take a certain anesthetic without harm, while another might die in the chair; and in the latter case, though not your fault in any degree, if it could be proven that you did not know the contents of the local anesthetic or the proportions of each drug used, you might be chargeable with gross negligence; for it might be argued, and with some force, that had you known the proportions of the various drugs, you might have also known that the particular patient in question would not stand such a combination, and thus it would be argued that the accident could have been averted.

The same theory is involved where a dentist undertakes to perform a new operation or use a new instrument; he must exercise judgment and care. He cannot interpose his judgment contrary to what has become a settled mode of treatment. Should injury result from experimentation with his patient, he can be held liable in damages for the same.

Experimentation with new instruments and new methods is dangerous for the first time; however, if a dental practitioner has a new mode of operation or treatment suggest itself to him as applicable to the case at hand, and it is founded upon good judgment, and, furthermore, he could prove that it was advantageous over the old method in vogue, or that it was the only one available, he is privileged to practice the same; and there is no doubt but that a jury would exonerate him if the injury could not be directly attributed to an unskillful and imprudent operation, for where a reasonable doubt or uncertainty exists a dentist cannot be held liable for an honest error of judgment.

Another branch of this subject is suggested right here, and that is malpractice, which may be defined as bad or unskilled practice

in a dental surgeon, whereby an unskillful operation is performed, the health of a patient impaired, or his life destroyed, by the improper or careless administration of medicines or anesthetics.

A dentist may be proceeded against for malpractice either in a criminal or civil suit.

The greatest number of criminal actions for homicide arise in cases where death has resulted from the administration of an anesthetic agent, particularly chloroform.

In the whole domain of dental jurisprudence, no criminal charge brought in a criminal court of justice against a dentist can be conceived more grave than the accusation of having committed rape on a female patient in whom he has induced anesthesia. Several legal cases of this charcter are recorded, where the defendant was found guilty and imprisoned for his alleged crime. The women no doubt believed that they had been violated, at least most of them, but it is certain that in many of these cases, and probably in all of them, they mistook the subjective erotic sensations induced by the anesthetic for the real act.

A dental practitioner may be exposed to grave charges of this nature, and it is a serious matter worthy of careful consideration. Not infrequently the accusation is based upon and solely sustained by the evidence of the plaintiff; therefore, it is very important that a practitioner should have his assistant present, or some person upon whom he can rely to protect him against such a charge made while administering an anesthetic.

The first question that arises with reference to the duty of the patient to the dentist is what was the contract entered into between them.

The contract between a dentist and his patient for compensation for services rendered may be expressed or implied.

An express contract is one that is formally stated, either verbally or in writing, while an implied contract is one that is inferred from the acts and conduct of the parties and the attending circumstances.

Under the implied contract the general practitioner agrees to render certain services with the ordinary degree of skill and with due care, and he does not become an insurer or assume the responsibility of the results, while the patient who accepts the services promises to pay an adequate reward fixed by the dentist for the services rendered.

It now seems well settled in law that a dentist can charge for time not actually spent in operation upon a patient, yet set aside for him by appointment. In these cases the court views the acceptance by a patient of an appointment for a specific time with a dentist as an implied contract, the understood terms thereof holding the patient responsible for such accepted time if he voluntarily violates the contract by failing to keep the appointment.

A dental practitioner may legally recover a fee the amount of which was fixed by an express contract, but if no agreement was made stipulating the fee to be received by the dentist for his services, he is entitled to recover a reasonable fee; it may vary according to the circumstances. For instance, an eminent practitioner,

with an established reputation and long experience, can reasonably demand a larger fee than a less experienced practitioner for the same services, as it is presumed that the party employed him with a knowledge of this circumstance.

One of the most important points to be considered by a dentist under this subject is the claim for services rendered to a married woman. First notice the general rule, then we will consider the exceptions.

The presumption of law is, that when a married woman obtains necessaries for the family of her husband and herself she is acting as the agent of her husband, and on him lies the primary duty of furnishing and paying for such services or necessaries; and dental work is considered a necessary, at least so much as is needed for the health or comfort of the person under consideration.

When the work done for a married woman or her children is needed, you can hold the husband liable. But it often happens that you are dealing with a married woman who is known to you to be responsible and her husband insolvent, and you may desire to have her become responsible for the bill. In order to accomplish this beyond question, you should ask her to become personally liable for the services rendered, and charge the bill to her. Should you simply charge the services to her without any promise from her to pay the same, she may claim that she was acting as agent for her husband, and you have what is termed a border case, which will be decided, if taken in the courts, upon the circumstances peculiar to the case. This statement is based upon the assumption that the work done is needed. When you pass from the necessary work to that which would come under the head of ornamental or extravagant work, you could recover for such services from a married woman without a special agreement that she would be personally liable therefor.

A question may arise as to the services rendered a minor. The law is, if he has a parent or guardian who provides for him he can not be held personally liable for dental services, but the contract must be with one of them; but if it is shown that they do not so provide for him, and the work is necessary for his health or comfort, the minor can then be held personally liable and he can charge his separate estate.

To the book accounts of the dental practitioner much legal importance is attached in proving his claim for services.

It is of practical consequence that the entries be made in the day-book, on the same day the service is rendered, although some authorities allow a short grace after the day, and these entries should be made by the dentist personally. The account should be charged to the person who is to pay it, and give dates, items, and prices.

One of the very best methods which has come to my notice is that of separate slips, upon which is a diagram of the upper and lower dentures. One of these slips is used for each patient, checking each tooth treated, specifying the nature of the filling, and, if this method is carried out systematically, it is not only a guide for future reference, but it may prove of great assistance should a dis-

pute arise at a future time as to the work done. But by far the greatest importance of this system is the fact that you would have a photograph of every patient's teeth, which may prove of inestimable value to you in later years. For instance, a body is found, which is so disfigured as to be beyond recognition, but it is suspected to be that of a certain person; if you should be called upon to make an examination of the teeth for purposes of identification of the body, you would be able to establish the fact of its identity, or non-identity, by the aid of your slips, even though you did not remember the patient personally, and thus render a great assistance either to a bereaved family, or, as has happened, bring a culprit to justice in some complicated case, and incidentally receive a handsome fee.

A dentist can recover for the services rendered by his assistant, and this rule seems to hold good even though the assistant is not licensed to practice dentistry, when the work is done under the direct supervision of the dentist with whom he is studying; likewise, the dentist will also be held liable in damages for any injury his assistant, acting within the scope of his employment, does a patient, through want of skill, or carelessness and negligence on his part.

In connection with the subject of claims for services, it may be of interest to know what exemptions a party may have should you procure judgment on an account. Of course this is the only purpose of introducing the subject here.

A single man has no exemptions whatever from an execution, unless one or more are dependent upon him for support, and for whom he provides; while a married man who has a family to support is afforded protection by law by making a certain amount of household furniture and utensils exempt from execution, and, besides the above exemptions, he has still further protection by claiming an exemption for necessary household furniture and working tools, and team, and professional instruments, not to exceed the sum of two hundred and fifty dollars. This provision is founded upon sound judgment and public policy, and often protects the honest poor from the hardships which would be inflicted upon them by their creditors.

Discussion.

Dr. W. C. Barrett, of Buffalo, said that the paper was one which he was very glad to have heard read before the convention. Many dentists are ignorant on this subject, and it is often very necessary that they should be posted. There is a work published on dental jurisprudence, but it does not cover some of the points touched on in this paper. Many dentists have got themselves into trouble that would have been avoided with a better knowledge of the law in relation to dental practice.

A dentist should under no circumstances administer an anesthetic to a lady except he has a reliable person present whose testimony would protect him in case of a false accusation. A dentist in Philadelphia suffered a term in prison on such an accusation who was quite innocent of any crime, and there is always danger

of any dentist having to repeat his experience who administers an anesthetic except in the presence of witnesses. He reported a case in his own practice of a lady whom he had anesthetized, fortunately in the presence of her husband, who while coming out of the effect of the anesthetic evidently went through all the sensations of a complete orgasm. The embarrassing situation may be imagined, as the husband was standing by and witnessed the whole proceeding. Dr. Barrett took the husband to the next room and explained to him that it sometimes happened to a woman under the influence of an anesthetic that she imagined an erotic passage with so much vividness of detail and of sensation that it was difficult or quite impossible to convince her that it was not real, and that perhaps this would be so in the case of his wife. The husband returned to his wife, and very soon Dr. Barrett heard their voices in dispute, the wife protesting that something had occurred, while the husband insisted that he was present all the time, and that it was impossible. At last the wife quieted down, and they left the office. She never got over it, and probably always thought that she was right; and if the husband had not been there, Dr. Barrett said his days of usefulness in the profession would have been ended, though he would have been just as innocent as some others so accused have been.

Many dentists have suffered in their reputation and practice from this cause, and many women have gone out of a dentist's office feeling that that had taken place which had never occurred, and their influence would, of course, be always against that dentist's practice.

Many other points, for instance in regard to contracts, are of much importance to have in mind, and he wished to thank the committee who induced so capable a man to write and read before this convention such an admirable paper.

Dr. Low moved that a vote of thanks for the paper should be given the essayist, which was done.

Dr. Jas. H. Beebee, of Rochester, said the paper touched upon one subject which was of importance to the dentist; this was the indiscriminate puncturing of the gums and injecting them with nostrums of whose composition we are ignorant, for the purpose of inducing local anesthesia. Such nostrums may be harmless, but the man is very foolish who puts himself into the jaws of a lion by using material of which he knows nothing. The action of cocain hydrochlorid is so uncertain that it is doubtful whether one is ever justified in using it, but there can be no defense for one who uses he doesn't know what.

Dr. C. F. Booth, of Canandaigua, asked if a preparation was bought of a reliable dealer and had been used for two years by a dentist, and also was used by many others in the profession, would there be any wrong in the dentists continuing its use?

Dr. Beebee said that he would never use such a preparation once without knowing what it contained.

Dr. Barrett said that if at any time evil effects followed the use of such an anesthetic the dentist would be responsible, and not the dealer who sold it.

Mr. SHAW said that the advisability of administering such an anesthetic would often depend upon the condition of the patient. This would be a question of fact that the jury would have to pass upon, and almost inevitably the judge would charge the jury that the dentist who used a remedy not knowing what it contained was guilty of negligence, because he could not know whether the particular patient would be injuriously affected by it.

Dr. W. A. BARROWS, of Buffalo, asked why dentists should not be exempt from jury duty as well as physicians.

Mr. SHAW said the cases were different, as a physician's patient might be put in jeopardy of death if the physician was compelled to serve on a jury, while there usually was little danger to the patients of a dentist.

Dr. F. W. LOW said an effort had been made to have dentists exempted from jury duty, but it was unsuccessful. When summoned they were compelled to report, but the rule was for them to be excused from service.

Mr. SHAW, in closing the discussion, said that dentists were frequently not prompt enough in collecting their accounts. He believed it would be better for all concerned to be more business-like in this matter, and to let their patients know that all accounts were to be settled promptly.

(To be continued.)

DENTAL SOCIETY ANNOUNCEMENTS.

CHICAGO DENTAL SOCIETY.

THE Chicago Dental Society will celebrate its thirty-third anniversary, Monday and Tuesday, February 1 and 2, 1897, by giving a clinic with about twenty-five operators each morning from 9 to 12 A.M. Papers will be read Monday afternoon and evening and Tuesday afternoon, closing the exercises with a dinner at 6.30 P.M. Members of the profession are cordially invited to be present. Headquarters for visitors will be at the Palmer House, where special rates may be obtained. This will be the first attempt on the part of the Chicago dentists to entertain their friends since the World's Fair, and they hope to have a large attendance.

Full programs will be issued about January 15, giving the location of clinic rooms, etc.

Clinic Committee, E. D. Swain, J. W. Wassall, Louis Ottofy, D. M. Cattell, A. W. Harlan, Chairman, 1000/Masonic Temple.

LOUIS OTTOFY, *President.*
A. H. PECK, *Secretary.*

ODONTOGRAPHIC SOCIETY OF CHICAGO.

AT the annual meeting of the Odontographic Society of Chicago, held December 17, 1896, the election of officers resulted as follows: Geo. B. Perry, president; S. W. Schwartz, vice-president; Edmund Noyes, treas-

urer; H. H. Wilson, secretary; W. H. Fox, member of Board of Directors; E. K. Bennington (Chairman), B. G. Johnson, H. J. Goslee, Board of Censors.

H. H. Wilson, *Secretary*,
1010 Champlain Bldg.

California State Dental Association.

Officers for the current year are as follows: Dr. Russell H. Cool, Oakland, president; Dr. F. H. Metcalf, Sacramento, first vice-president; Dr. Walter F. Lewis, Oakland, second vice-president; Dr. L. Van Orden, San Francisco, third vice-president; Dr. W. L. King, San Francisco, recording secretary; Dr. Frank C. Pague, San Francisco, corresponding secretary; Dr. Thomas Inglehart, San Francisco, treasurer.

Frank C. Pague, D.D.S., F.S.C., *Corresponding Secretary*,
819 Market st., San Francisco.

California State Board of Dental Examiners.

At an election held December 1, 1896, Dr. F. W. Bliss, of Santa Cruz, was elected president, and Dr. W. A. Moore, of Benicia, was elected secretary of the California State Board of Dental Examiners.

W. A. Moore, *Secretary*.

Washington City Dental Society.

At the annual meeting held at the Wellington Hotel, Dec. 15, 1896, the following officers were elected for the ensuing year: D. E. Wiber, president; W. N. Cogan, vice-president; Chas. W. Appler, secretary; M. F. Finley, treasurer; H. B. Noble, librarian; H. J. Allen, essayist.

C. W. Appler, *Secretary*,
1115 G st., N. W.

EDITORIAL.

The Outlook.

The beginning of a new year furnishes a proper occasion for certain considerations, both retrospective and prospective, in relation to our progress as a profession. Those who have kept at all in touch with the trend of dental affairs must have been impressed with the rapid changes which are taking place all along the line of dental activity. Methods and ideas which found general acceptance even ten years ago have in very many instances given place to others better adapted and more securely founded upon exactness and accuracy. The practical man's query of how to do it is being answered to the advantage of all concerned, as the outgrowth of an increasing interest in the problem of why we do it. It is this continued development of interest in the reasons why of our work

which characterizes the progress of dentistry of the last decade more than anything else, and which is replacing the old uncertain empirical methods of practice by those which are rational and scientific.

The year just closed is one which has been full of good results in all departments of dental interest. Many contributions to our stock of knowledge, the outcome of careful scientific research, have been made by men in our profession whose researches will bear favorable comparison with the best scientific results attained in any other department of human endeavor. In appraising the value of this class of work as work, the standard of valuation should not be the utilitarian standard, but rather the measure of the ability brought to the solution of the several problems. Judged by that standard, not a little of original work reported by dental investigators during the past year has been of the highest order of merit. Further than this, the interest in original work is steadily increasing and bids fair to become general. The periodical literature of dentistry shows, if it shows anything, that the tendency of the worker in these days is to get at the facts, and that the reign of the dreamer and enthusiast is passing.

The most satisfactory result of this investigating tendency and interest in research work by dentists is the broadening effect which it exerts upon the profession intellectually. Through its various channels for the dissemination of knowledge, its journals, its associations, its colleges, the dental profession is constantly receiving an influx of new intellectual pabulum which is definitely changing the whole complexion of its thought and stimulating its mental activities along higher planes. That these conclusions are based upon fact will be evident from a comparison of the condition of affairs exhibited by our literature of past years with that of the present time. No doubt the antique croaker who believes that "there is nothing new under the sun" will contend that all we now have as a basis for our professional pride was well known when he first entered upon practice, and we may grant that he has a partial foundation for his belief, so far as the material side of dentistry is concerned; but the progress which is new, which after all is the only thing that counts as true progress, is not so much what we know, but how we regard what we know. It is the old distinction between knowledge and wisdom, and it is upon this latter commodity more than the former that our claims to distinction as a profession must be founded in order to be warranted. An advance along this line may be fairly claimed. Readers of the DENTAL COSMOS of some twenty years ago may recollect that in a contro-

versial passage with the *Medical Times* the then editor of that journal derisively charged the then editor of the DENTAL COSMOS with holding the belief that dentistry was "drifting into a profession." The record of the period since that troublous time shows that the belief was well founded as well as prophetic. The growth of dentistry, whatever may be its final outcome, has at least been such as to win for it deserved distinction and place among the established branches of the healing art, no one of which has developed greater or more deserving results.

What has been done must, and indeed may safely, be taken as an earnest of what will be accomplished. The increasing interest in such fields of physical science as have relation to dentistry will be still further cultivated. The study of electro-physics as applied to therapeutics and to improvements in dental technique; the study of metallurgical chemistry and physics, which has gained renewed importance by the researches of Black; the advance in histological and embryological study made possible by the work of Williams; the studies in oral and cranial anatomy and surgery by Cryer, and work of allied character by a host of specialists in other fields, is certain to attract workers and stimulate investigation which must result in still greater improvement in all departments of dentistry. The uncertainties of empirical practice are being gradually replaced by the exactness of rational methods. This is true not only of the art of dentistry as it finds its applications in practice, but is equally true of dental therapeutics in a general sense. The advances which have been recently made in the foundations of medical science, particularly in the domain of pathology, have had not only a direct effect upon many of our therapeutic procedures, but indirectly by stimulating research in the special field of dental pathology. As a result, our knowledge of the systemic relations of the oral cavity, its contents and adnexa, has been enlarged; and the importance of this knowledge of the systemic relations of the oral cavity has brought about corresponding changes in treatment. It is further evident that the old hiatus between dentistry and the parent profession of medicine is being slowly but surely obliterated by the evolutional growth of each toward the other, and it is cause for satisfaction and congratulation that the bridging of this chasm has in a large degree been the result of dental effort and progress.

If, then, the basis of this advance in the past has been, as we believe, the natural outcome of good work thoroughly performed, let us renew the effort in the same direction, with the hope and expectation that the close of the now new year may witness the solution of more of the yet unsolved problems of dental science.

Dentin.

After due consideration of the matter, we have decided to adopt, in connection with the work of this journal, the method of spelling this word without the final *e*. The Century Dictionary has adopted this form, and it is in line with the general tendency to omit the final *e* in words where its phonetic value is *nil*. The dropping of the final *e* in connection with a number of chemical terms has been authorized by the American Association for Advancement of Science, and in the new form is finding general acceptance. The Committee on Nomenclature of the American Dental Association has recommended the change in connection with dentine, and in furtherance of the idea the word will henceforth appear in this journal as dentin.

BIBLIOGRAPHICAL.

A Treatise on Surgery by American Authors. For Students and Practitioners of Surgery and Medicine. Edited by Roswell Park, A.M., M.D., Professor of the Principles and Practice of Surgery and Clinical Surgery in the Medical Department of the University of Buffalo. In two octavo volumes, containing 1600 pages and 850 engravings, and about 40 full-page illustrations in color and monochrome. Lea Brothers & Company, Publishers, Philadelphia. Price, cloth, $4.50; leather, $5.50 (net).

A careful examination of this work warrants us in saying that no other treatise which has heretofore appeared upon the subject so fully measures up to the requirements of a sound and thorough exposition of the principles and art of surgery as this one. If a better one exists it is not within our knowledge. The reader is at once struck with the fact that the great advancement which has in recent years taken place in our knowledge of pathology is fully reflected in the applications which it finds in the practice of surgery. The surgeon must first of all be a pathologist of the most practical type in order to successfully treat his cases; and a recognition of this fact is the basis of the work under consideration. The exact and scientific character which has been assumed by pathology in recent years has conferred upon surgical practice a positive quality which it formerly lacked. It has in this respect been the first department of the healing art to derive benefit and impetus from the growth of scientific pathological investigations,

and has for that reason made relatively greater advances than has general medicine toward positive and rational methods of cure.

As correct pathological knowledge is an essential to all successful practice, a proper understanding of the foundation principles of pathology must underlie dental as well as medical and surgical practice. No general work within our knowledge furnishes a better presentation of these essentials, and if a book on general surgery is to find a place in the list of recognized text-books of our dental schools, this should be the one chosen from among the many now in the field.

It recognizes fully the importance of the pathological states of the mouth and its associate parts, but needs some further amplification in this direction to make it complete. The common error in the matter of delineating the teeth, of making monstrosities of those useful as well as ornamental organs, occurs in a few instances, but on the whole the work is, as before stated, the best of its kind within our knowledge, and should find a place on the shelf of every careful and progressive student of dentistry.

DENTAL LEGISLATION.

THE LOW BRIDGE PATENT CASE.

FOLLOWING is the text of the decision of the U. S. Circuit Court of Appeals in the case of the Low Bridge patent:

UNITED STATES CIRCUIT COURT OF APPEALS, SECOND CIRCUIT.

The International Tooth Crown Company, complainant and appellant,

vs.

Allan G. Bennett, respondent and appellee.

This is an appeal from a decree of the United States Circuit Court, Eastern District of New York, dismissing the bill. The suit is brought to enjoin infringement of Letters Patent No. 238,940, issued March 15, 1881, to James E. Low for an improvement in dentistry. Suit was heretofore brought by this complainant in the Southern District of New York on the same patent (with others) against one Richmond; the patent was sustained and infringement found (30 Fed. Rep. 775). In the suit at bar the Circuit Court found a prior use anticipating the patentee's invention, and for that reason dismissed the bill (72 Fed. Rep. 169).

Per Curiam. We do not deem it necessary to add anything to the discussion of the case in the Circuit Court. We concur with the learned judge who tried the cause in the conclusion that the real invention of the patentee was a device (consisting of a band or cap and attachments thereto) for permanently inserting artificial teeth without the use of a plate, and without using the gum as a support to the artificial denture, his device holding the tooth in place with sufficient strength to stand the strain of ordinary mastication by attaching it rigidly to the natural dentition. This invention could be put in practice by rigidly attaching the artificial tooth either to a single natural tooth adjoining it on one side, or to two adjoining natural teeth, one on each side.

The specification of the patent sets forth that:

"A band of gold or other suitable metal is first prepared and accurately

fitted around the tooth adjacent to the vacant spaces to be supplied with an artificial tooth. This band is firmly secured in place by cement, which effectually excludes water or the fluids of the mouth and is thus permanently attached to the tooth so that it cannot be removed without an operation directly for that purpose. It is sometimes sufficient to prepare one of the adjacent teeth in this way; but generally it is desirable to prepare the adjacent teeth on each side of the vacant space. It will always be advisable to do so if the vacant place is to be occupied with more than one tooth."

The invention is not a bridge with two abutments. A bridge with abutments existed in the prior art. The contribution which Low's patent undertook to make to the art was an improved kind of abutment, and that improvement would be availed of when the process pointed out in the above quotation was applied to a single tooth. The circumstance that in the first claim the words, "bands" and "permanent teeth" are in the plural is not significant. The language is made broad enough to cover the process generally, and for that reason uses the plural. It claims "the herein-described method of inserting and supporting artificial teeth," but certainly no one would contend that because of the use of the words "artificial *teeth*" in the plural the claim would not be infringed by the insertion of a single tooth. If the patent were valid the insertion of a single artificial tooth firmly secured to a band of gold accurately fitted and cemented to a natural tooth adjacent to the vacant space to be filled with such artificial tooth, and wholly supported by its attachment to such adjacent natural tooth, without dependence on the gum beneath said artificial tooth would be an infringement. If this were done before the application for the patent it would be an anticipation. The evidence that this is what was done in the case of Mrs. Mertz is to our minds clear and convincing. The date is established beyond a doubt, and it is equally certain that the artificial tooth thus attached was used for years. We concur therefore with the judge who heard the cause in the Circuit Court that the so-called "Beardslee-Mertz 1877 Permanent Bridge" is an anticipation of the device of the patent.

Complainant contends that the Beardslee-Mertz device does not anticipate the second claim of the patent. The specification, referring to the artificial block or tooth, says, "The lower surface adjacent to the gum is cut away at the back, and only descends to contact with the gum along its front edge, so as to prevent the appearance of an open space between the artificial teeth and the gum." The second claim reads as follows:

"An artificial tooth cut away at the back, so as not to present any contact with the gum except along its front lower edge, and supported by rigid attachment to one or more adjoining permanent teeth, substantially as and for the purpose set forth."

Complainant's counsel in argument and brief contends that in the Beardslee-Mertz device the artificial tooth is not cut away at the back. The very device, however, which was worn by Mrs. Mertz for years has been produced and, while it is not cut away in the back as much as are the devices shown in the drawing of the patent, it is manifestly sloped upwards, so as not to bear upon the gums. The extent to which the back is cut away is immaterial so long as the cutting away is sufficient to avoid pressure on the gum and leave the artificial tooth or block supported wholly by attachment to the natural dentition. Complainant's own expert speaking of the Beardslee-Mertz device says,—

"If the teeth, that is, the artificial crowns, did not bear upon the gums, and were properly and sufficiently supported by adjacent caps or crowns, and the dates were early enough, I suppose they would meet that portion of the second claim of the patent in suit wherein a single natural tooth is used as a support for an adjacent artificial tooth, without bringing the artificial tooth in contact with the gum."

The date is definitely fixed, and the evidence shows that the artificial crown did not bear upon the gum, and was properly and sufficiently supported by the adjacent cap around the crown of the adjacent tooth. Under the construction which must be given to the patent as indicated above, the Beardslee-Mertz device anticipates the second claim as well as the first.

The decree of the Circuit Court is affirmed with costs.

JUDGES LACOMBE AND TOWNSEND.

PUBLISHER'S NOTICE.

THE DENTAL COSMOS FOR 1897.

BEGINNING with this issue (January, 1897), every number of the DENTAL COSMOS hereafter will be printed from new types. This assures the continued typographical superiority of the journal. It is a pleasure to read from clean, clear type, and we are glad to be able to afford our readers this advantage.

The current number, which introduces the XXXIXth volume, is an earnest of what may be expected by subscribers during the year,—a monthly symposium on the achievements of and the outlook for dentistry. This issue alone ought to be worth the year's subscription price to any thoughtful dentist.

No effort will be spared, by editor or publisher, to make every succeeding number as worthy of the support of the profession. We believe it is a generally admitted fact that the DENTAL COSMOS excels all other journals in the number and value of its real contributions to dental knowledge; that it is the one dental journal which is worthy to rank with the best representatives of the technical literature of any profession. There will be no lowering of its aims, no lagging in carrying them out.

The DENTAL COSMOS will continue in the forefront of dental journalism; will continue to be the one dental journal without which no dentist can hope to keep pace with the advances of his profession, in theory or practice.

We ask the support of dentists for the DENTAL COSMOS on the plain ground that it is to their advantage to support it; no practitioner can read its pages without being benefited in his work.

The DENTAL COSMOS Calendar is issued as usual to subscribers.

Subscriptions may begin at any time. Subscription price, $2.50 a year in advance to United States, Canada, and Mexico; $3.00 to other Universal Postal Union countries; half a year half price.

Subscriptions may be sent direct or through dealers in dentists' supplies.

THE S. S. WHITE DENTAL MFG. CO.

OBITUARY.

Dr. Henry F. Maasch.

Died, in New York city, December 4, 1896, of tumor at the base of the brain, Henry F. Maasch, D.D.S., in the thirty-first year of his age.

Dr. Maasch was born in the city of Hanover, Germany, in 1865. He came to America, and in 1881 entered upon his dental studies with Dr. C. A. Timme. He graduated at the New York College of Dentistry with the class of 1889, and entered upon a dental practice in New York city in that year which continued with marked success up to the time of his decease. He was married to Katharine Braun, of New York, who survives him.

HINTS, QUERIES AND COMMENTS.

To the Editor of the Dental Cosmos:

Sir,—I note in the November issue of your journal a letter from Cincinnati on cataphoresis, which I would prefer for personal reasons not criticising; but the inference to be drawn is so misleading that I feel compelled to set aside my own wishes in the matter, and give your readers some conclusions, reached by careful study and observation, which are entirely contradictory to those reached by Dr. Buxbaum.

First, I repeat what I have said publicly many times, any machine will produce the results hoped for, if manipulated by one familiar with the fundamental principles of electro-therapy, so that it is to correct the possible impression his letter may create in the minds of those just starting in the use of the galvanic current for medicating purposes that this is written. In commenting upon the advantages of his last apparatus, he says he finds it more powerful, the interpretation of which would mean an increase of the electro-motive force, and this being a great advantage in producing rapid and satisfactory results. That this is erroneous and contrary to the electro-pathological conditions I will leave to such authority as Biglow, Houston, Kennelly, and Flemming; and to the same gentlemen as well willingly submit the following solution of the problem, as to whether the deductions are not logical at least.

Upon the introduction of a galvanic current into the soft tissues, their contraction ensues, together with a coagulation of serum, at the contact of the positive pole, the density depending upon the amount of electro-motive force (number of volts) employed, which prevents the rapid absorption of solution, particularly those made of cocain salts. If the application is continued, a relaxation takes place, but not before the medicament has become dammed up on the surface to such an extent as to increase the resistance sufficient to cause the consumption of very much more time in obtaining perfect results. A very satisfactory proof of this can be had by an observation of the following phenomena: when using the current upon the teeth for anesthetic purposes, and severe pain is caused (by the pressure of current), the milliamperemeter will give a very low reading.

Now, if the electro-motive force, or number of volts, is reduced sufficiently to relieve the patient entirely from pain, the meter will immediately show an increase of more than twice the volume in many cases, which leads to the conclusion that the resistance has been diminished by the reduction

of contraction, or coagulation, and in all such cases satisfactory results may be looked for in very much less time, and with no discomfort to the patient.

The same laws of electrical science are applicable to dental electro-therapy as are observed in general medicine, with the addition of extra caution, made necessary by the minuteness of the parts to be operated upon.

In conclusion, this letter is not in defence of one machine alone, but of all. And as related to cataphoresis it is a protest against the use of a high-tension current upon parts having a resistance in the neighborhood of thirty thousand ohms, to the end that the earnest efforts of the dental profession to relieve suffering humanity may not miscarry, and as a result bring upon this boon the condemnation of the general public and the scientific world.

F. T. Van Woert, Brooklyn, N. Y.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING NOVEMBER, 1896.

November 3.—No. 570,573, to D. W. Tower. Tooth-brush.
" " No. 570,864, to F. S. Belyea. Dental plugger.
" *10.*—No. 571,102, to L. L. White. Mold for shaping metallic tooth crowns.
" " No. 571,166, to H. D. Justi. Support and carrier for artificial teeth.
" " No. 571,176, to Robert N. Stockton. Dental plugger.
" " No. 571,209, to J. F. Adams. Chin rest for dental operating chairs.
" *17.*—No. 571,644, to J. S. Campbell. Artificial teeth.
" " No. 571,556, to Frank Comer. Method of bridging teeth.
" *24.*—No. 571,965, to J. T. Barker. Dental instrument.
" " No. 571,970, to H. F. Harvey. Dental obtunder.
" " No. 572,030, to F. C. Ries and H. H. Johnson. Dental engine.

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ORIGINAL COMMUNICATIONS.

THE RELATION OF ART AND SCIENCE IN DENTISTRY.

BY DR. J. FREMONT BURKET, KINGMAN, KANSAS.

THE true relation of art and science in dentistry is not generally understood. Even when a comprehension of what constitutes art and what constitutes science exists in the mind of the student of dental literature, he is continually confused by the loose interchange of the terms *art* and *science*.

This ambiguity, though sometimes caused by carelessness on the part of the writer, is largely due to the blending, in the early history of the different languages, of the two ideas,—art, the essence of which is in production, and science, the essence of which is in knowledge,—and including both under art. This was the case with the Latin language and the Romance languages that sprang from it. For this reason the seven sciences—grammar, logic, rhetoric, arithmetic, geometry, astronomy, and music—have all been called arts when they were meant to denote "The contemplation of things in the mind." Perhaps the German language has done still more to increase this confusion, inasmuch as it has been so large a contributor to science. It was not till after 1670 that *wissenschaft*, the separate word for science, came into use. Previous to that time *kunst* was used to designate both science, what I know, and art, what I can do. The Greek, however, had distinct terms for the two conceptions—contemplation and production. Even in our own language Webster, after defining the two terms, declares them synonymous, though in the restricted sense of the word.

But from this confusion that had arisen and still largely prevails in contemplation and language, modern philosophers have extricated us by enunciating what is science and what is art, and declaring the relation that exists between them. Mill in his "Logic" says that science consists in knowing, art in doing; that "The proposi-

tions of science assert a matter of fact, an existence, co-existence, or a resemblance." Propositions of art "do not assert that anything *is*, but enjoin that something *should be*."

There are two relationships between art and science. One is art subordinate to science,—What shall I do in order to know? the other is science subordinate to art,—What shall I know in order to do? It is plain that the latter relationship is the one that obtains in dentistry. Hence the science is subordinate to the art, and for the purpose of study, dentistry may be regarded as an art, as all rules of art must be grounded in the theorems of science. We reach this conception of the logical relationship of art and science in dentistry: Dentistry is an art, and its rules are grounded in the underlying sciences, as physiology, pathology, chemistry. This logical relation of art and science in the development of dentistry accords with Mill's definition: "The art proposes to itself an end to be attained, defines the end and hands it over to science. The science receives it, considers it as a phenomenon or effect to be studied, and having investigated its causes and conditions, sends it back to art with a theorem of the causes and combinations by which it could be produced. Art then examines these combinations of circumstances, and according as any of them are or are not in human power, pronounces the end attainable or not. Science then lends to art the proposition (obtained by a series of inductions or deductions) that the performance of certain actions will attain the end. From these premises art concludes that the performance of these actions is desirable, and finding it also practicable, converts the theorem into a rule or precept." From the science arises the art. It does not follow, however, that dentistry has always advanced according to this logical relation of art and science. Its history shows that it has not. In modern dentistry, at least, the art was the precursor of the science by many years. But art and science ever tend toward each other,—the art seeking to root itself in science, the science endeavoring to express itself in art, which is its only mode of expression.

Almost a century ago, when dentistry was still considered a mere art, we see the feeble manifestations of this relationship. The materials used for artificial dentures were human teeth and the teeth and bones of animals. These discolored, softened, and emitted a bad odor, when subject to the fluids of the mouth. The art declared that there should be an "indestructible" material for these dentures. The art proposed to itself that end to be attained, and handed it over to the science of chemistry. The result was porcelain teeth. The relation of science and art is clear. The porcelain tooth was a contribution to art, and through it dentistry rooted itself in the science of chemistry and chemistry expressed itself in dental art. In like manner art proposed that decayed teeth should be filled with a substance that would arrest decay and restore their body and contour, and handed the proposition to chemistry. Filling-materials that fulfilled the purpose was the result, and the continued progress of the art and science along this line resulted in dental metallurgy. Again art proposed the restoration to health

of the diseased tissues of the mouth, and turned with this major premise to pathology. The result was dental therapeutics, by which the science of pathology expressed itself in dental art. Here dentistry reached the border land of dentistry and medicine, where both hold common ground and the relation of art and science is the same in each. Beyond it the applications of science have a wider field in medicine, while the art idea advances in dentistry. Art in the medical profession must ever be confined to the expression of science in rules and formulas, as embodied in therapeutics for example; while in dentistry it rises to the plane of the fine arts, inasmuch as it gives scope to an equally high order of talent and observation. In prosthetic dentistry, where the highest object to be attained is the restoration of the natural features or expression of the human face, the dentist must continually pass beyond the reach of mere rules, and act by what is termed inspiration or "the unreasoned working together of infinitely complex and highly developed sensibilities and dexterities in his constitution." The demand in dentistry for the continual exercise of this high order of ability would of itself place it on a level with the fine arts and forever above the strictly utilitarian ones.

Examples might be drawn all along the line of nearly a century's advancement in dentistry showing how the art has proposed to itself some end to be attained, defined it and handed the proposition to science, thereby uniting itself with the different sciences that underlie it, broadening its field of usefulness and rising in dignity to its present place among the learned professions.

Of more interest, perhaps, is an observation of the relation of art and science in solving dental problems of the present. Art has proposed that a remedy for pyorrhea is desirable and handed the proposition to pathology, through which science she is arriving at her conclusion; she has assumed that there should be an ideal filling-material, and seeks through the science of chemistry that end; she has enunciated the desirability of a safe anesthetic, and hypnotism is being investigated with the other sciences for that result; she has indicated the need of better regulating appliances, and from the science of applied mechanics is endeavoring to evolve rules for their construction. On the other hand, the underlying sciences are extending their domain. Pathology is continually enriched by scientific investigation. The growth of the science of electricity is phenomenal. Chemistry is advancing; and the interfusion of chemistry and physics has formed a comparatively new field, rich in present yield and in promise. Thus the sciences are developing and seeking expression as art shall call them forth.

It would seem from these observations that the progress of dentistry now and in the future must depend upon those who, comprehending the art at its present attainment and discerning its onward trend, perceive its needs (what should be),—the first step or major premise, which belongs to art,—and being familiar with the sciences that underlie it, are able to search there for theorems from which to evolve rule or precept.

We have noted, however, that art is often the precursor of science, or, in other words, it is carried forward without a knowledge of its science. This is ever due to that genius which Schopenhauer says "mightily begets art." Art in music furnishes an example of this genius in Bach, who employed fugues in his musical compositions years before the laws governing harmonics were known. But they could not be employed by others, because there was no known law or science at that time to explain them. For, as science can express itself only in art, so art can explain itself only through science. The advancement of art in this way can only be through the genius of the few; although, quoting Schopenhauer again, "so much of genius is in all men that they can see through the artist's eyes and follow where he leads." But they must ever be followers and not contributors.

The practice of an art without a knowledge of its science is like the schoolboy's solution of a problem in arithmetic without an understanding of the principles that make that solution correct. The teacher places the solution on the blackboard, the boy readily catches the art, and with his youthful memory is able to reproduce it; but it soon becomes obliterated from his mind. Let him, however, solve it through an understanding of its principles, and it becomes his own. According to his capacity he is ready for comparison, relation, and classification. What is true of arithmetic as an art is true of all art. He who sees only through the artist's eyes and follows where he leads must ever be without individuality and the power of independent progress. Science alone makes free, and a successful mastery of the art of dentistry necessitates a knowledge of its sciences. True, there is something in the man that makes the dentist,—a native skill or adaptability without which no amount of study of the sciences or grasping after the art could make a successful practitioner. But grant that ability and a right command of the art must include a knowledge of the science. This calls for study, for knowledge is not born with any one as is skill or art, as you may please to call it. In respect to knowledge, individuals differ only in the readiness to perceive and acquire and the ability to appropriate and retain. This has led to that oft-quoted saying, "Genius is only the capacity for hard work." But it is not a true statement. Genius reaches its end by a kind of intuitive power which connects it with art or skill in the sense that the two are synonymous; and, like art, genius must explain itself through science, though it may have reached the end through an intuitive power. The attainment of a dentist and the benefit he may become to the profession then depends largely upon his scientific qualifications. There are many practitioners, however, who have but a vague idea of its sciences. They became dentists for a vocation by which to make a living, and regard it merely as a business; and in their hands it descends toward the plane of a trade—one of the servile arts. Such a man cares little to pursue his scientific studies beyond grammar-school physiology, a few druggists' receipts, and the filling-materials on the market. He generally tries to make a specialty of crown- and bridge-work because there is

money in it. And he does make some money at the expense of an innocent—or shall we say ignorant?—public and to the degradation of the profession. How different the ability that dentist brings to his patients, and beyond them to the profession, to whom the whole field of biology lies open, and who, familiar with the rise of pathology from mystery and error to a science, seeks from symptomatology to etiology; and who in his laboratory can bring to bear upon the researches of others his own methods of investigation. Just in proportion as men cease to become dentists by grasping after the art as a means of livelihood, or for the sake of posing as a professional man, but seek to enter the profession through a study of its basic sciences, will dentistry maintain a high place among the professions. The old saying, "There is room at the top," might well be changed to read, "There is room at the bottom," for too many are attempting to stand at the top without having gone through the drudgery that alone would enable them to stand there. Certain it is, that he who has a sure footing on the foundations of the art,—the science,—other things being equal, will find himself at the "top" in good time.

No dentist need settle down with the regret that his opportunities were limited when he entered the profession. Scientific study and research are within the reach of every one who has the ability to become a dentist. Finally, every dentist must be something of a scientist in order to read and comprehend the foremost writers of dental literature, to say nothing of appropriating their ideas. He can well afford to take time for this, for the error that science is impractical and unremunerative is being dispelled. It arose, no doubt, from the conception of the study of science for its own sake, which in a profession like that of dentistry might yield small, if any, returns; but when pursued with a true understanding of its relation to the art which it supports, it may be in the highest degree practical and remunerative. If a worthy interest in his profession would lead him to aim higher than personal proficiency and business returns, he may be stimulated by the fact that the history of discoveries and inventions shows that they are rarely made and perfected by any one person. It is the small contributions of the many that result in a great achievement. Lavosier, whose name will ever be told in the history of chemistry, made no discoveries in the science, but gave new explanations and methods of attainment concerning the products of others. The science had reached the advancement of his day through the efforts of others, many of them obscure, perhaps, and his was the genius that gave it a new aspect. The toilers who made his work possible were as great benefactors of humanity as he. Study, improvement, and the promotion of human happiness are peculiarly the accompaniments of a dentist all along his life-work. It is an accepted fact that a study of the sciences, as well as a study of the classics, brings culture; and it brings what is perhaps of more importance in the struggle and modern rush of business life,—self-helpfulness.

In a comparison with the students just entering the profession,

older practitioners of fewer opportunities may not be at a great disadvantage. Eminent scientists tell us that the present educational system tends to unfit students for independent research. Early childhood is the time when those faculties are most susceptible to training. Mere repetition work and lesson learning, that form so large a part of the school curriculum, tend to dwarf rather than stimulate them. Their development requires that the child be kept busy applying his knowledge and solving problems. All through school life the object should be that the pupil become familiar with scientific method and acquire the power to do independently, rather than accumulate knowledge. When thus trained, the school-room becomes to him a kind of workshop as well as a place of learning; and when he passes beyond its threshold, the world appears but a larger workshop for the exercise of his trained faculties. He has become familiar with scientific method, has learned to see and to work independently, and so is able not only to follow readily the researches of others, but to take up original investigation leading to discovery. Is not this education in the highest and truest sense of that word? But it must necessarily be a long time before professional schools can be supplied with students the result of such a system. There is a promising movement that way in educational lines, but the old, with its dulling examinations, is slow in passing, and the new has much of prejudice to overcome. A potent hastening of such a movement is the cultivation of sentiment in its favor. A sure result of it in dentistry would be a rapid and permanent development of the art and science in their logical relation,—the science expressing itself in art, and the art rooting and explaining itself in the science.

The Relative Efficiency of Various Current Controllers for Cataphoresis.

BY W. A. PRICE, D.D.S., CLEVELAND, O.

(Read before the Ohio State Dental Society at Columbus, Ohio, Dec. 2, 1896.)

It is my purpose in this paper to confine the discussion to the various principles used, and not to mention individual instruments.

I must express my obligations to Professors Miller, Langley, and Carter, all of Case School of Applied Science, for their excellent assistance in experiments and tests, and for the use of very excellent scientific apparatus, without which I could have done but little.

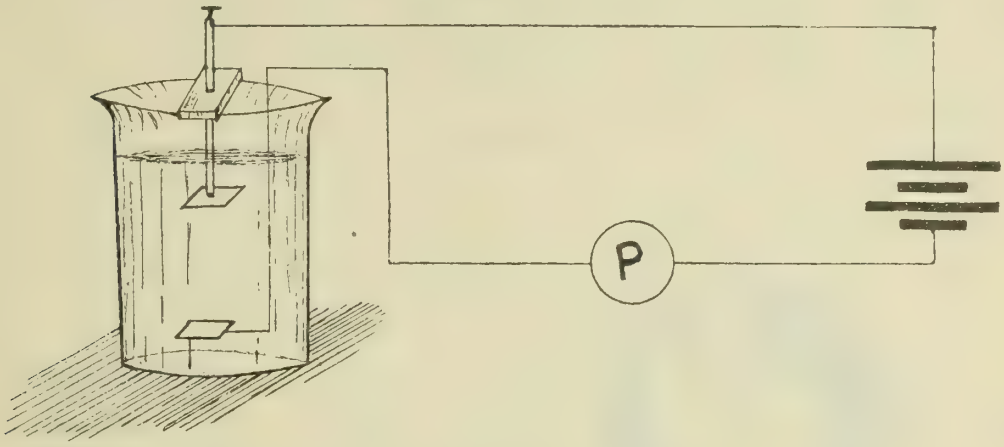
The function of a controller is to furnish an electric current absolutely at the will of the operator. There are seven distinct varieties of instruments on the market for this purpose. Let us note the distinctive characteristics of each.

First, the water rheostat, Fig. 1, which is placed in series with the battery and patient. One pole of the current is placed in the bottom of a jar of water, and the other attached to a sliding post. The current passes through the patient, the water, and

the batteries in series, and is controlled by varying the distance between the end of the sliding post and the bottom of the jar, the amount of current being controlled by the amount of water.

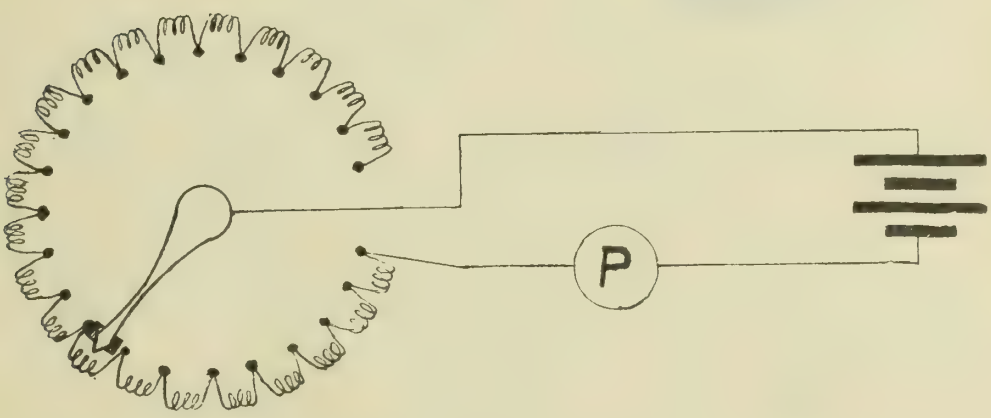
The next, Fig. 2, is constructed on the same principle, except that the current goes through fine German-silver wire instead of

FIG. 1.



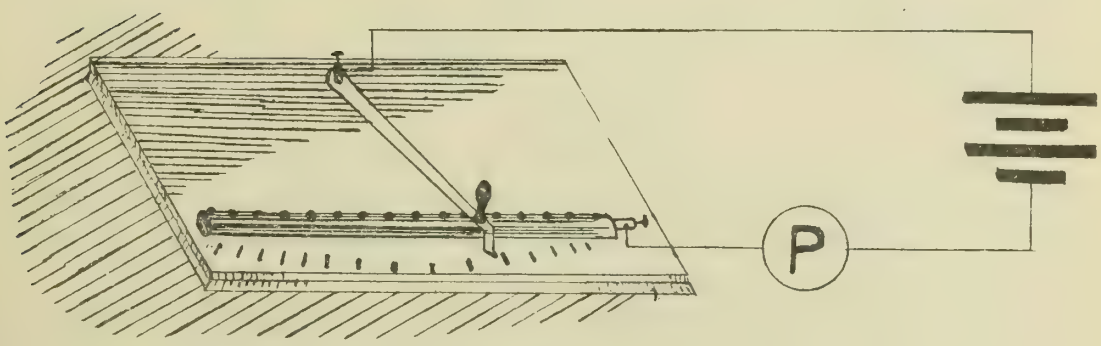
LIQUID RESISTANCE.

FIG. 2.



GERMAN SILVER RESISTANCE.

FIG. 3.



CARBON ROD RESISTANCE.

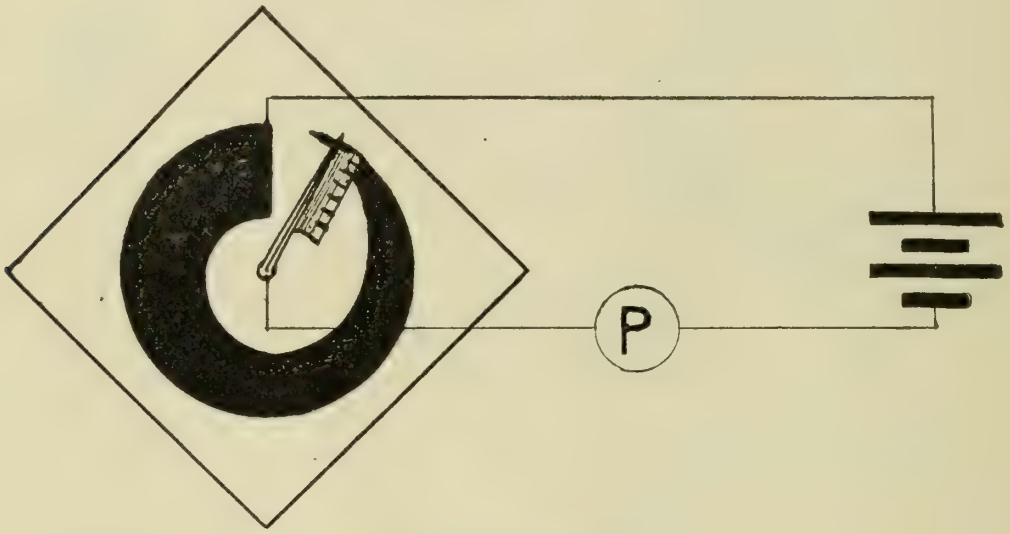
water, and the amount of current is controlled and varied by the amount of wire put in the circuit. As in Fig. 1, the current passes through the patient, the rheostat, and the batteries in series.

Fig. 3 is identical in principle, but instead of passing the current through fine wire, it is passed through green carbon of relatively a

very high resistance. The piece of carbon has little screws inserted, very closely together, and the resistance is increased by moving the contact lever farther from the end, to which is attached the other pole of the current.

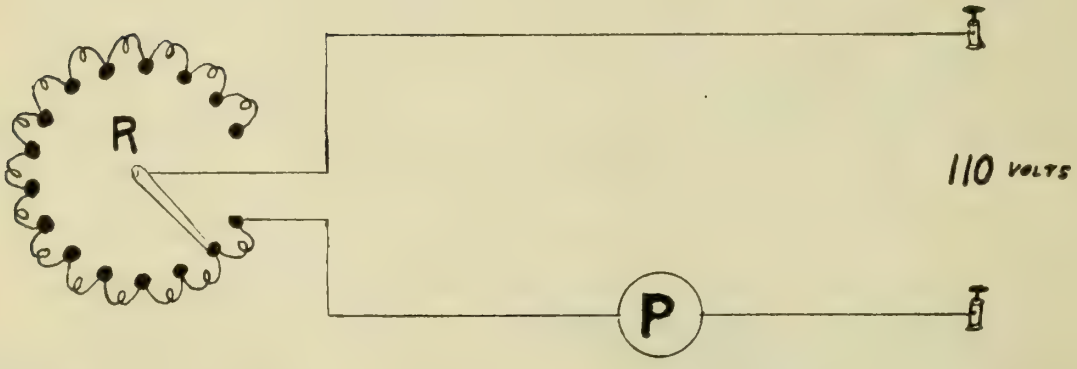
Fig. 4 is very similar to Fig. 3, except that it is another form of carbon, namely: graphite baked on a piece of slate or glass. The current is controlled by the position of the lever, which has a metallic brush contact with the graphite. As in all the preceding forms, the current goes through the patient, rheostat, and the batteries in series.

FIG. 4.



GRAPHITE RESISTANCE.

FIG. 5.



In the next, Fig. 5, the current is taken from the 110-volt circuit and passed through sufficient resistance, usually graphite or powdered carbon, to cut it down to a sufficiently low potential. Necessarily a much larger resistance is used.

In Fig. 6 we have an entirely different principle for controlling the current, which is taken from the 110-volt circuit, and two paths are made for it to flow through,—the one through the patient and the other through a variable quantity of German-silver resistance wire. The ratio of these currents to each other is inversely in proportion to the resistance of their path. For example, if the path L P M, Fig. 6, has a total resistance of 20,000 ohms and the path L R M has a resistance of 2000 ohms, the relation of the current flowing through L P M to the total current flowing is as

2000 is to 20,000 plus 2000, or one-eleventh, ten-elevenths flowing through L R M.

By varying the relation of the resistance in these two paths the current in both is varied; so since the resistance of the patient is fixed, the current in that path, viz: L P M, is varied by changing the resistance in the path L R M. By increasing the resistance of L R M the total amount of current flowing through the two paths

FIG. 6.

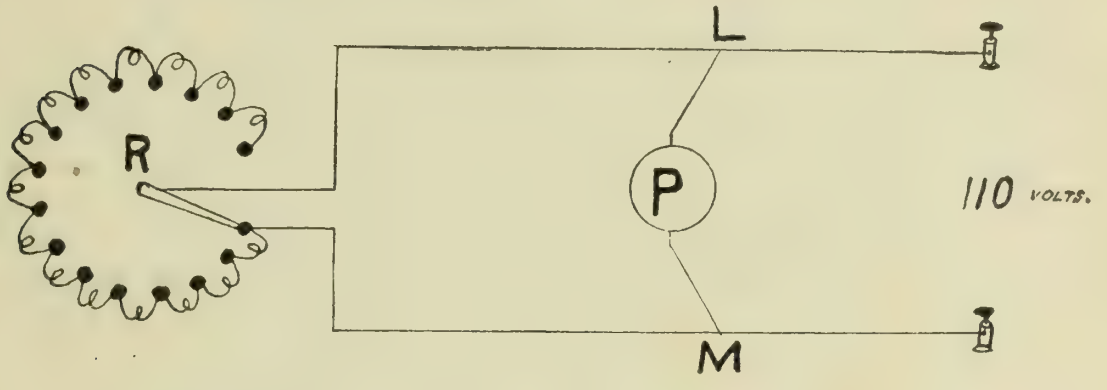


FIG. 7.

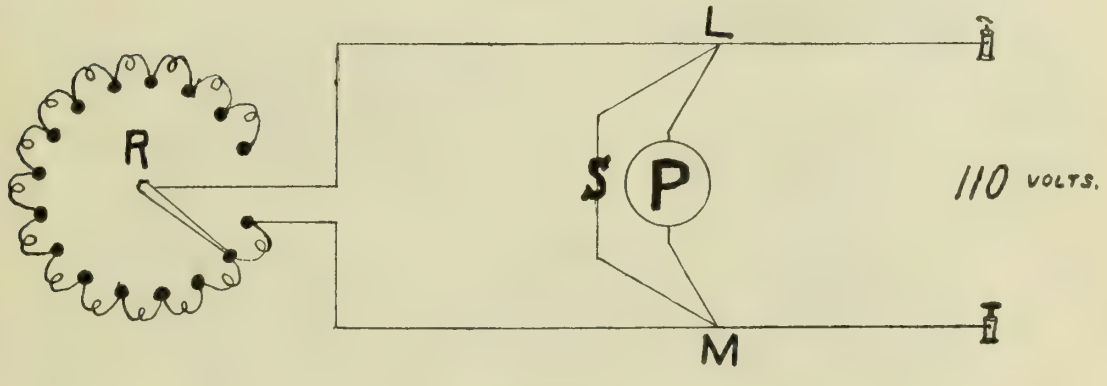
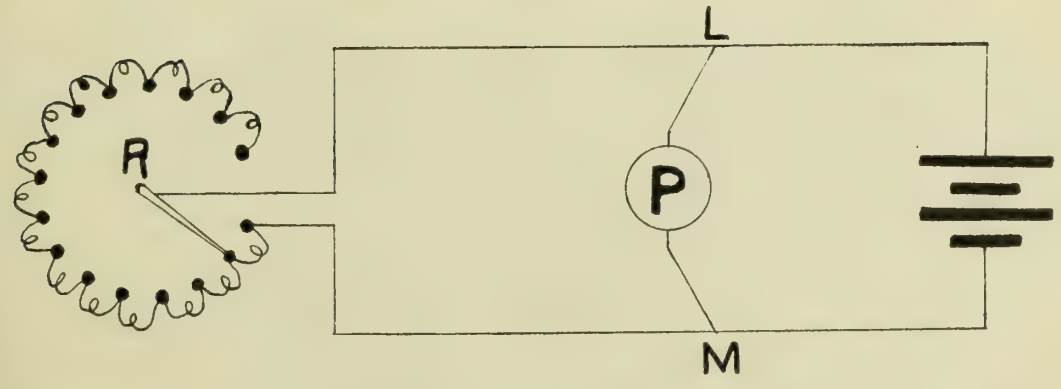


FIG. 8.



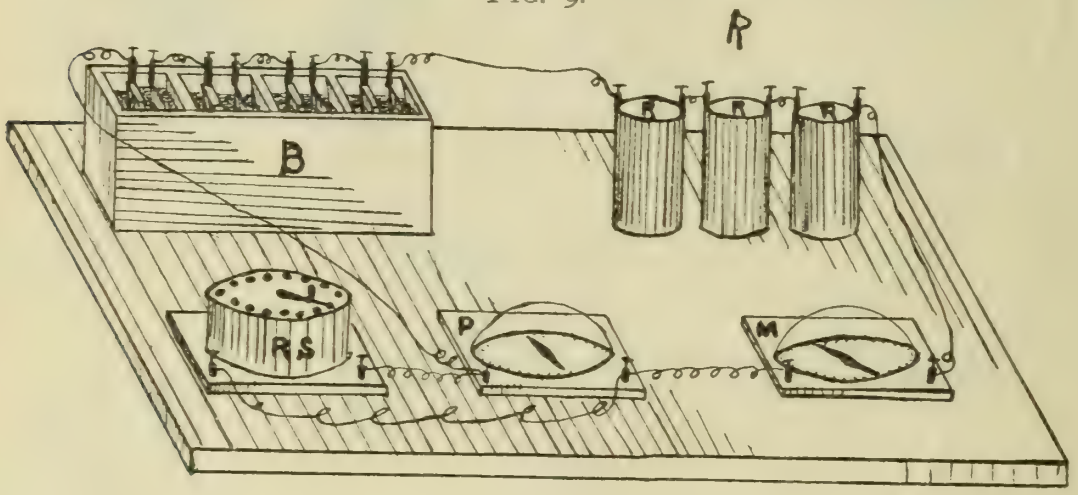
is diminished in proportion to the total increase of resistance of the combined paths. The next, Fig. 7, is similar to the last, except that it has a three-way shunt. Two of them are constant, viz: L P M, in which the patient is the resistance, and L S M, which is a definite amount of German-silver wire. The third, L R M, has a variable amount of resistance wire, and the relative amount of current flowing through these paths is varied according to the relation of their resistances, always in inverse proportion, and is varied by changing the amount of resistance in L R M. In

the last, Fig. 8, the principle is identical with Fig. 6, the difference being only in the source of current. In this case it is batteries instead of the 110-volt circuit.

Just here let us review some of the laws of electricity. First, the amount of current flowing depends on two things,—the electro-motive force, or potential, or voltage, and on the amount of resistance in the path.

The unit of electric pressure is a volt. The unit of current-strength is the ampere, and is the strength of current necessary to decompose .09326 milligrams of water in one second. A milli-ampere is the one-thousandth part of an ampere. The unit of resistance is an ohm, and is the amount of resistance through which one volt pressure will produce one ampere of current. This is simply one way of expressing Ohm's law, which is, that the electric pressure divided by the resistance is equal to the current. The electric pressure is expressed as the voltage, the resistance as ohms, and the amount of current flowing as amperes.

Fig. 9.



The volts over the ohms equal the amperes, or the volts over the amperes equal the ohms. Doubtless you are all very familiar with these terms, but I review them for fear some one is not, and I shall use them hereafter entirely to express these quantities.

Let us next consider the conditions in the patient as the current passes in through the medicine and tooth and out through the body at some more or less distant point. The amount of work done in a given case depends upon the amount of current flowing, and the amount of current is fixed by the pain limit. Two things are practically definite in every individual cavity, viz: the resistance through the patient and the pain limit. The former is relatively a different quantity in different patients and in different cavities of the same patient, and as a more or less remote point on the body is used from which to take the current. The average resistance through the patient for about twenty-five cases was about 25,000 ohms, varying all the way from 10,000 to 78,000 ohms, and in some cases even higher. The difference of resistance from the hand to the tooth and the cheek to the tooth is from 3000 to 5000 ohms. It is almost incredible the amount that the

resistance can be varied by the condition of the cavity. For example, in a given case the resistance through the patient from the cavity, which was barely moist, to hand was 47,700 ohms. A forty per cent. solution of cocain in water placed in the cavity reduced the total resistance to 28,500 ohms, and placing the pad on the cheek instead of the hand reduced it to 23,800 ohms. These measurements are approximately accurate, for they were made by standard instruments, most of them from the source named above. This is only a fair sample of many cases I have the figures for here at this time.

Measurements of liquid resistances, such as the body, cannot be made with a Wheatstone bridge as can solid substances, owing to a secondary induced current set up by the electrolysis of the fluid. They can best be calculated by Ohm's law. For example, an accurate volt-meter reading in tenths indicates a difference of potential across the patient of 5.7 volts, and a milliampere meter reading in hundredths of thousandths of amperes indicated twenty one-hundred-thousandths; then the resistance of a patient would equal 5.7 over twenty one-hundred-thousandths, or 28,500 ohms. Ordinary commercial milliampere meters that I have tried to use and compared with the standard instruments would not register with any degree of accuracy through the first few degrees of the scale, —the only part needed,—nor would volt-meters. The milliampere meter used for most of these measurements could be adjusted to read in any fraction of an ampere from one-thousandth to one-millionth. The average resistance from the hand to the tongue with small electrodes is about 9000 ohms, varying from 7000 to 12,000, and from the cheek to the tongue about 5000 ohms, varying from 3000 to 7000. It will be seen at a glance that by far the greater part of the resistance of the patient is in the tooth, varying all the way from 1000 ohms to 70,000, an average of probably near 2000 ohms.

Measuring cavities at different stages during the excavating, with as nearly as possible the same conditions, shows a gradual decrease of the total resistance, in many cases many thousand ohms.

Time will not permit of many figures on the relative resistance of dentin taken from different parts of the same tooth and from different teeth, and the variation of resistance of the same section of dentin according as it is saturated with different solutions. For example, a longitudinal section of fresh dentin almost dry on the surface and five millimeters in thickness had a resistance of 30,000 ohms; after dehydrating and saturating with a forty per cent. solution of cocain the resistance was reduced to 4500 ohms, and on again dehydrating and saturating with a sodium-chlorid solution (common salt) the resistance was reduced to 3070 ohms. The bearing of this on the process of cataphoresis will develop later.

Is the pain limit variable for a given cavity? Yes, though it is normally almost constant, except when medicated, in a case where there is no inflammation of the dentin or pulp, and where the patient's general nerve-tone is constant.

Is there any *physical* difference in a *constant* electric current of a given strength, however it may be produced? This is probably the most universal question in the minds of the members of our profession at this stage of the advancement of cataphoresis. No, there is not, according to the opinions of all electrical authorities I have been able to find, provided the current be *constant* and perfectly regular, and of a given strength. This will seem a contradiction to the experience of many of you who have used currents derived from different sources, as it did to myself.

The next may seem a greater contradiction to some of your experiences. Is there any difference in the physiological effect of a constant and perfectly regular electric current, however it may be produced? Provided the conditions remain the same and it is without variation, answer, *no.* I mean by that, that a current of one ten-thousandth of an ampere produced by passing a current of four volts through 40,000 ohms resistance, say 25,000 ohms resistance in the patient and 15,000 ohms resistance placed in the circuit, will cause identically the same amount of pain as a current produced by passing a current of eighteen volts through 180,000 ohms resistance, or a current produced by passing seventy-two volts through 720,000 ohms resistance, or a current produced by passing one hundred and eight volts through 1,080,000 ohms resistance; provided it is turned on in such a way as not to produce shock. I have done this frequently in my practice as follows: The reflecting galvanometer was set to read two hundred and forty points to the milliampere. A current with a difference of potential between the poles of the batteries of six volts was allowed to pass through the patient and some resistance. The resistance was cut out gradually until the patient felt a definite sensation of pain. At this point the milliampere meter indicated one hundred and forty-two points, or 142-240 of a milliampere. This current was cut off carefully. Next a current with a difference of potential between the poles of the battery of eighteen volts was allowed to pass through a much higher resistance, and the patient instructed to give a signal when the same definite sensation was felt by reducing the resistance, which he did when the needle stood at just one hundred and forty-two points. This current was cut off and one of twenty-one volts through a higher resistance passed, and the patient instructed to signal when the same definite sensation was produced by cutting out the resistance. He did so, and the needle stood at just precisely one hundred and forty-two. This was stopped and forty-eight volts difference of potential passed through a higher resistance, and the patient's signal was given when the needle was at just one hundred and forty-two. Then a current of one hundred and eight volts was adjusted in the same manner, and the signal came when the needle was at just one hundred and forty-two points, great regularity being required in cutting out resistance.

I have done this frequently with myself and with a great many of my patients, and have always gotten the same results, though some patients could not determine a definite sensation as

accurately as others. I have sufficient apparatus here, and will assist any of you to make the experiment upon yourself at the close of the session. If you try the experiment, be sure to fasten the electrodes firmly in their respective positions, and do not disturb them a particle throughout all the tests. I think I can demonstrate it so you all can see with the reflex produced in this frog's leg. You see that by turning the current on very gradually, so as not to produce a sudden stimulation, there is actually no difference in the angle of contraction produced by these different currents. This means, if all the conditions necessary have been covered, that any apparatus that will perfectly control the current is just as good as any other. But have all the conditions necessary been covered? No! I have here like resistances of the various substances used for that purpose, each with a total resistance of 45,800 ohms, and if the statement is true that a current of definite strength is physically the same it matters not how it is obtained, then the same electro-motive force passed through these different materials of equal resistance should give the same physiological effect. You put this electrode on your tongue and you cannot distinguish any difference in the sensation. The sensation of feeling seems to be identical with the indications presented in the reflex of this frog's leg. These resistances are German-silver wire, water, and graphite, and are connected alternately on this switch-board for convenience, and you cannot detect any perceptible difference in the reflex of the frog or the sensation on your tongue by passing the current through one or another of these substances. This answers the question whether any one substance used as the medium of resistance produces any more or any less pain than any other substance, *all the conditions remaining the same.* It certainly does not, although we hear so many assertions to the contrary.

Let us repeat what was asserted before, that a *constant* and perfectly regular current of definite strength will produce the same physiological effect under the same conditions, no matter how produced. If you apply two electrodes to your tongue, it is a broken circuit, not a constant one. What difference does it make whether a current is constant or not? I wish you could each try this next experiment upon your own tongue, although this frog's leg reflex will demonstrate it. We will use as nearly as possible the same current strength in every case as indicated by this galvanometer. In the first case we will use a voltage of one and a half volts and pass it through 3840 ohms resistance; in the next, eighteen volts through 45,800 ohms; and in the next, one hundred and ten volts through 282,050 ohms. In each we will get a current strength of thirty-nine one-hundredths of an ampere. With the first, with a sudden make or break of circuit, you see but a slight, though definite, reflex of the frog's leg; with the next, though identically the same amount of current, there is a decidedly greater reflex; and with the last, a still greater increase of the strength of the reflex. What is the explanation? Suppose you have three pumps so regulated with governors that they will keep just thirty-nine barrels of water circulating per

minute through each of three separate complete circuit systems of pipes. The first system has just enough miles of pipe so that the pressure that accumulates at the pump to force that amount of water around the circuit per minute is one and a half pounds to the square inch. In the second system there are enough miles of pipe so that the pressure at the pump as it sends out the water is eighteen pounds per square inch. In the third there are just enough miles of pipe to produce a pressure of one hundred and ten pounds per square inch at the outgoing side of the pump, in order to force the thirty-nine barrels around through the circuit per minute. Now suppose in the first a check of some kind is put anywhere in the circuit so that no water can get past; then the pressure will rise all the way along in the pipe as far as the check to one and a half pounds per square inch, that being the limit of the pump's pressure. Suppose a check is put in anywhere in system No. 2, and the pressure will rise all along that system to the check to eighteen pounds per square inch. And so with the third system; the pressure all the way from the pump to the check would rise to one hundred and ten pounds per square inch. Let us suppose one pound to be the pressure required to force thirty-nine barrels of water through one mile of pipe per minute; now suppose these checks were to be suddenly removed, what would be the strength of current for the first instant? In the first case it would be at the rate of one and a half times thirty-nine barrels per minute, or fifty-eight and a half barrels; in the second at the rate of 702 barrels per minute, and in the third at the rate of 4290 barrels per minute. This rate would last for only an instant, and would immediately decrease until it reached its normal rate. The time this increased rate would last could hardly be calculated, but it exists, and we have all observed it at the hydrant. This is precisely what occurs in the circuit of an electric current when it is broken. This produces what is called the throw of a needle of a current meter, some of which are constructed to not register this first impulse. Although there is such a difference in the reflex produced by these two currents by a sudden make or break, you will see there is no difference in the amount of work they will accomplish, for we will now connect them with these tubes of iodid of potassium, and the amount of electrolysis is identical. If I turn these various currents on slowly enough, there is no perceptible difference in the reflex produced on this frog's leg or the pain produced on the tongue or in a tooth. It is not necessary to break a current to get this effect, for it takes place to a greater or less extent with every variation of potential or of the total resistance of the circuit.

There are certain facts accompanying the process of cataphoresis which materially determine the requirements of a satisfactory controller. First, the current strength cannot remain *constant;* it must be continually increased as the pain limit will admit, owing to the anesthetizing of the tooth. This is accomplished in two ways,—either by increasing the voltage or by diminishing the resistance of the circuit. The former causes pain if done too rap-

idly or in too large quantities, and that in some cases as low as one-twentieth of a volt; the latter produces pain if diminished too rapidly or in too large quantities. Even if there are 50,000 ohms resistance in the circuit and the total is reduced by 100 ohms, it will frequently produce pain. Another fact attending this operation is that the total resistance of the circuit cannot be kept constant. Any movement of the electrodes, especially the one in the tooth, though ever so slight, may vary the total resistance of the circuit to almost any amount. No operator should ever attempt to hold the electrode in his hand, for it is impossible to prevent causing some variation in resistance of the circuit at that point. It is not necessary. Flexible fine gold or platinum wire (which by the way the dental depots would do well to furnish), about four one-thousandths of an inch in diameter, packed into the cavity with cotton carrying the medicament will be infinitely more satisfactory, or any of the many excellent clamps for that purpose. In over three hundred cases I have not required to hold the anode in a dozen. A special device can be made in a couple of minutes for any special case. Another source of variation of the total resistance is from the cavity or the pad drying out, and when moistened producing shock by a sudden increase of current, due to lowering the total resistance. It is absolutely impossible for us to keep a constant and perfectly regular current. We would not if we could, and we could not if we would.

Since the current cannot be kept constant, we should, for the least risk of producing pain by variations of current, keep the total resistance in the circuit as low as possible. If using batteries with resistance in series, do not use any more cells than will do the work; for while if the current were to remain absolutely constant there would be no difference in the pain produced, since that is clearly impossible, and there must and will be variations, for the many reasons given, there will be more intense shocks caused by the same variation. If you get an apparatus in which the resistance is in series with the patient and batteries, be sure it is wired so you can turn on one or more cells at a time. I have had cases where 50,000 ohms resistance in series with one cell and the patient produced unbearable pain, and the resistance had to be increased to 108,000 ohms. What would have been the effect if I could not use less than twelve or fifteen or twenty cells in series, or if my total resistance did not exceed 1000 to 5000 ohms, as some do? An apparatus to be sufficient for all these extremely sensitive cases should, if resistance is put in series, have a total variation of not less than 100,000 ohms. Probably not over ten per cent. of cases will require over 70,000, nor over twenty-five per cent. require over 40,000.

Let us next consider the other principle for controlling the current, viz: by means of a shunt. Suppose the resistance of L P M (Fig. 6) to be 25,000 ohms, which is, of course, the resistance of the patient, and the difference of potential between L and M is one hundred and ten volts, what must be the resistance of L R M to cause one milliampere of current to flow through L P M? It will

require some introduced resistance at L or M to limit the amount of current within easy control. Let us say two lamps of 275 ohms resistance each. According to the law of inverse proportions, the current flowing through L P M is to the current flowing through L R M as the resistance of L R M is to the resistance of L P M. The resistance of L R M approximately is 160 ohms. Suppose the resistance of the patient to be 40,000 ohms; then L R M will be approximately 325 ohms. If L R M equal 10,000 ohms, then to give one milliampere L R M equals approximately 58 ohms. You will see at once that the amount of resistance placed in the shunt L R M is no indication of the amount of current flowing through L P M, unless you know the resistance of L P M. Hence, since the resistance of patients is such an uncertain and widely varying quantity in different cavities, it is impossible to arrange any scale of indication of the actual amount of current any given case is getting. If the resistance of the patient was universally one ohm or any other definite quantity, or any approximate quantity, then an arbitrary scale could be just as approximately correct. Under the existing positively uncertain conditions, they have practically no definite significance. This includes the indicators of so-called volt selecters. This problem of shunts is very complicated, and I will dwell on it at greater length in my closing discussion.

What is the effect of breaking or making the current of one path of a two-way shunt? You get the actual true current strength as the first sensation. For example, suppose the resistance of a patient to be 20,000 ohms, and one-tenth of a milliampere is flowing through the patient's circuit, L P M, then the difference of potential between the two sides of a patient would be two volts, and the patient would get the same amount of shock that he would from a cell giving two volts, when there was no resistance in series. If the resistance of a patient were 50,000 ohms, and one-twentieth of a milliampere of current was flowing, then the difference of potential across the patient would be ten volts, and the patient would get the same shock he would from five cells in series giving two volts each. You see by this method the minimum possible shock is given, and since the variation is inevitable in the current strength, this is a very important item. This is very easily demonstrated by the frog's leg reflex and felt by the tongue.

Now a word as to the capacity and necessary requirements of any controller to do all cases absolutely painlessly and thoroughly, which is possible in ninety-five per cent. of cases. The instrument should be able to furnish a difference of potential across the patient of at least twenty volts, for actual measurements of cases show that some will finally and properly stand that amount of current. With an instrument taking the current from batteries with the resistance in series this simply means that there be enough cells to produce that voltage; but if a shunt from a 110-volt circuit, it should have a variable resistance in the shunt in proportion to the permanent resistance put in the circuit. If a shunt from batteries, the batteries should have a total voltage of thirty volts, and

the cells should be arranged with a cell selecter and a high variable resistance. This is one objection to a shunt on cells: that a greater variable resistance is necessary, owing to the lower potential, unless a very large number are used. It is not a practical objection, however, since the alternative is very practicable. It is clearly evident that a shunt is the most satisfactory means of controlling the current by far, from the experiments we have made, no matter from whence the source of the current. The economy of the cells is an important factor, and since a shunt of low resistance is simply a short circuit, the cells will not last so long as if less are used and a higher resistance in the shunt.

What are the shortcomings and points of superiority of these different methods we have considered?

First. The water rheostat. If platinum electrodes are used in distilled water, and the total resistance is high enough, not less than 100,000 ohms, which means a column of about twelve inches, according to the size of the electrode, and the mechanical working of the machine is such that a perfectly smooth and easy control is had of the current, it is just as good as any using identically this same principle. The majority of this variety have not one-quarter enough variation of resistance. Four inches of lake or river water has about 500 ohms resistance, and of salt water not 1000. Draw your own conclusions.

The German-silver resistance in the circuit in series is efficient accordingly as it is finely divided into steps or is sufficient in quantity. There should be 100,000 ohms, with steps of not less than 100 ohms for an ideal machine. It is probably as clean and durable as any. It is a fact, however, that the metallic contact connections, whether the points of a switch or a brush on a coil, are not constant, and I have not seen an instrument in which they were a part that would not show a fluctuation of current caused by them; not enough to be an excluding objection, if kept clean.

The objections to the metallic contact points in the green carbon stick are the above, also that there is not possible a great enough total variation of resistance, and the contact points cannot be closely enough together to prevent shock unless a very large board is used.

A system in which, as in Fig. 5, there is a very high resistance in series in the 110-volt circuit is not consistent, nor could its results be satisfactory. A difficulty with any form of lever to be moved by the hand over any carbon or graphite surface is that the distance it can be moved without producing shock is too small, unless the instrument be larger than those generally used. Powdered carbon is a very variable resistance. Where a three-way shunt is provided, more variation is required in the variable shunt, if its resistance be low. It is considered a guard against shock from variation of potential.

We have not referred to the automatic devices for increasing the potential or diminishing the resistance. All are good and are practical. Many are excellent, but need constant attention. This point has been overlooked by most manufacturers.

What are the logical conclusions to draw from the foregoing experiments?

(1) A method in which the principle of the device used for controlling the current is a shunt is preferable to any where the resistance is put in series in the circuit.

(2) Keep the total resistance of the circuit as low as possible.

(3) Remember that the sensation produced by suddenly breaking the current is very similar to that of making it suddenly, not identical, however.

(4) If the 110-volt current is practically without variation of potential, it is of almost equal efficiency with batteries as a source of current, provided a shunt system is used; not so if in series. It is not fairly constant, however, in all cities, nor in branches where the mains themselves are fairly constant. In many cities the direction of the current is frequently changed. Both of these are important items. The former would produce shock and the latter absolute failure, and I believe frequently does.

(5) Always keep just below the pain limit.

(6) The fluctuations felt sometimes by the patient are not always due to variations of current; they frequently are of physiological origin, which is easily proven.

(7) After testing for over six months on a dozen different varieties of instruments, and recording over 300 cases in which absolute failures were about two per cent., partial failures about eight per cent., and in which over thirty pulps were drilled out absolutely without pain, I have concluded that some principles used are inconsistent and the instruments using them failures; some others all right in some cases; some excellent, considering, but as yet none are just what the profession should demand and will some day get.

The Contributions of Dentistry to Surgery.

BY MATTHEW H. CRYER, M.D., D.D.S., PHILADELPHIA, PA.

(Read before the New York Odontological Society, November 17, 1896.)

In presenting this subject, the endeavor will be made to show some of the contributions to surgery which have had their origin in dentistry, and why dentists are especially fitted for special surgical practice. To be a dentist in the fullest sense of the term requires a highly specialized skill, great manipulative ability, and mechanical ingenuity.

The mechanical art of filling cavities in their often obscure and relatively inaccessible positions, and the demand that these operations be done deftly, firmly, and without endangering the vitality of the pulp, requires the greatest amount of technical ability and the possession of a highly cultivated muscular and nervous coordination. Lack of perfection in the work of the dentist cannot be covered up, mended, or excused, as is, to a considerable degree, the case in many other surgical operations. The reparative function of the tissues of the body is not a factor in the work of the

dentist, but, on the contrary, the fluids of the mouth, containing as they do agents which find ingress at the slightest crevice, from maladaptation of a filling, will soon undermine the work and ruin the operation. Absolute perfection of result is therefore the ideal condition which the dentist must repeatedly realize if he desires to be regarded as a successful operator, and the imperative necessity for its realization is a potent factor in his training in all departments of his work.

The teeth, situated as they are within the mouth, and immovably fixed upon bony tissue, are often in positions that render it very difficult to make the necessary observations, and free access to diseased portions is at times almost unattainable.

The structures of the teeth vary in texture from the hardest tissue within the body to the softest. Operations upon them therefore require at one time the exercise of considerable force, and again the most delicate touch-sense and manipulation.

In opening up and treating pulp-canals, as the instruments are passed into them, touch alone is depended upon to detect the condition of the canal or its contents. Constant daily work of this kind so educates the hand and fingers that they become highly sensitive, and often to such a degree that the sense of touch becomes more reliable as a guide than the sense of sight. The dentist is taught to use a great variety of instruments, and is also conversant with their manufacture. The constant handling of delicate instruments in close proximity with the peripheral ends of the most sensitive nerve of the body gives a training and dexterity not to be acquired in any other way.

Again, a dentist must be possessed of great patience. Not only the character of his daily operations in themselves, but the different temperaments with which he comes in contact, compel the development in him of the habit of self-control. The study of the individualities of his patients, and their treatment accordingly, become fixed habits with him.

The structures of the teeth are of such character that when once lost or cut away nature makes no restoration. In all of his operations this fact is constantly before the dentist, as retention of a filling may depend upon saving tooth-substance; and again, if more tooth-structure is cut away in operating upon the anterior teeth than is absolutely necessary, he damages his patient for life from an esthetic point of view; consequently this training compels him to become exceedingly careful in the conservation of tissue. He learns in time to place a high valuation upon the tissues which it is the business of his life to preserve and restore, and the conservative habit becomes a fixed characteristic. This careful training, when carried into surgery, and especially oral surgery, fits him, and in fact leads him, to perform operations involving the face with the least possible disfigurement.

The difficulties with which he is constantly dealing, the obscure position of the cavities, the impossibility of lighting up the parts, inability to control movements of the tongue and muscles of the cheeks and lips, the difficulty in keeping the cavities dry to gain

access to them, etc., develop in him a specialized group of faculties, both mental and technical, and a certain flexibility of resource, all of which, combined with his mechanical and manipulative skill and inventive ingenuity, render him well equipped to enter the field of oral surgery.

If we examine the history of oral surgery, we find it has not developed like other specialties of surgery, as a direct outgrowth from the mother science, but rather as an outgrowth of the practice of dentistry. It has grown toward general medicine and surgery from dentistry, until now we may properly view it as a bond of union between the two; it is the link connecting them. Perhaps the most important contribution which dentistry has made to surgery is the class of operators from her own ranks who have carried into surgical work the characteristics which they have derived from their dental training and experience. It is this class of operators who have developed oral surgery as a definite specialty.

Viewing the subject in this light, it will be seen that to properly practice it one must possess a knowledge of the principles and practice of general medicine and surgery and the special knowledge of their relation and application to his professional work, in addition to the training and knowledge derived from the study and practice of dentistry already alluded to.

The specialty of oral surgery has become firmly established as a recognized department of practice, and it is perhaps unique in that, while really a department of surgery, the educational approach to it is through dentistry, and not through medicine. That the rational method of achieving success in this branch should be through the avenues of dental education is the only logical conclusion, when the character of the dental training on one hand, and the relationship of the territorial field of the oral surgeon on the other hand, are considered.

It is not proposed that all dentists shall become oral surgeons any more than that all medical men shall be ophthalmologists or gynecologists; but all oral surgeons should have a dental as well as a medical education. Oral surgery comprises a study not only of the diseased condition in and about the mouth, but it includes the study and treatment of all diseases which have their origin in this region, even though they make their appearance in distant parts.

For example, it might be that a fluctuating tumor is observed near the point of the shoulder, and that afterward a fistula is seen at that point. At first sight this might be thought to have no connection with oral surgery, but on a closer examination of the case it might be traced to an abscess upon the root of one of the teeth. Again, certain diseases of the nose may have their origin traced to diseases which began as dental troubles.

More than this, affections of the eyes and ears have often been directly traced to diseases which began in or about the teeth.

The greater number of neuralgic affections found about the face, and it may be at distant parts of the head, are closely associated with the oral region, most of them having a local origin there.

But there is also the general aspect of this matter, so that, while it is important to be able to trace and recognize the causes and origins of neuralgias beginning in dental or maxillary irritations, it is equally important to know when and how such cases may be entirely excluded in making a diagnosis.

When we speak of the connection between surgery and dentistry we generally look at but one side,—the extension of dental disease to other parts; but there is another feature to be borne in mind,—the fact that disease processes in other parts of the cranium may affect the teeth through extension from comparatively distant anatomical parts. In an address delivered at the 1895 meeting of the American Dental Association I called attention to the fact that the infundibulum leading from the frontal sinus frequently opens, not into the middle meatus of the nasal chamber, but into the upper anterior portion of the maxillary sinus. I have seen several cases in which this anatomical feature has had a direct clinical bearing. Catarrhal disorders which were first evident in the region of the frontal sinus and anterior ethmoidal cells have become chronic; later, evidences of disorder have become manifest in the region of the antrum, causing a feeling of heaviness and dull pain. After a period, some of the posterior teeth give evidence of pericementitis, without any evidence of caries or any history of injury. In some of these cases pus may be found exuding from about the neck of a tooth or teeth. An inflammation of the lining tissues of the antral wall has caused closure of the arteries supplying the pulps of the teeth, which have died and septic inflammation has ensued. An examination by electric light will show the presence of an exudation in the antrum, and in some cases the extraction of a tooth may be followed by an escape of pus and mucus from the antrum.

I have seen other cases when, without any evidences of disease of the teeth or of tertiary syphilis, inflammatory and suppurative processes (osteomyelitis) have been found, which at a later period attacked the tissues about the teeth, causing a gradual necrosis of pericementum and alveolar walls. We see, therefore, that the study of oral surgery first requires that the oral surgeon shall know minutely the anatomy, physiology, and pathology of the parts with which he is dealing. This means more than one might at first suppose, as one cubic inch of the parts associated with the mouth contains more varied tissue than the entire leg.

He must also be familiar with the source and course of all blood-vessels and nerves found in the mouth and associated parts, which will include in his field of work organs of the thoracic cavity and those of the brain-case. Again, the maxillary bones articulating as they do with nearly all the bones of the head, a very complete knowledge of the osteology of this region is required; and as the mouth is the portal to a great anatomical system, it should receive the closest study, which necessitates also the observation of its continued avenue, the alimentary canal.

The indispensable instrument used in oral surgery is the surgical engine, which is but an enlarged and modified dental engine, and a self-evident contribution of dentistry to surgery.

The requirements of a satisfactory surgical engine are, first, that it be so geared that the velocity of the cutting tool is from four to six thousand revolutions per minute, which speed is to be maintained under varying pressures. The hand-piece (the chuck which holds the instruments) should be light, capable of easy adjustment, and so arranged that the instruments fixed in it may be carried with readiness into the recesses of deep cavities. There should be no undue vibration of the instrument while held to its work, to lessen tactile recognition of the nature of the tissue being cut. The motive power should be so arranged that it is under perfect control and produces steadiness and uniformity of speed. The hand-piece and its several parts, with the instruments used, must be of such character that perfect sterilization can be readily accomplished.

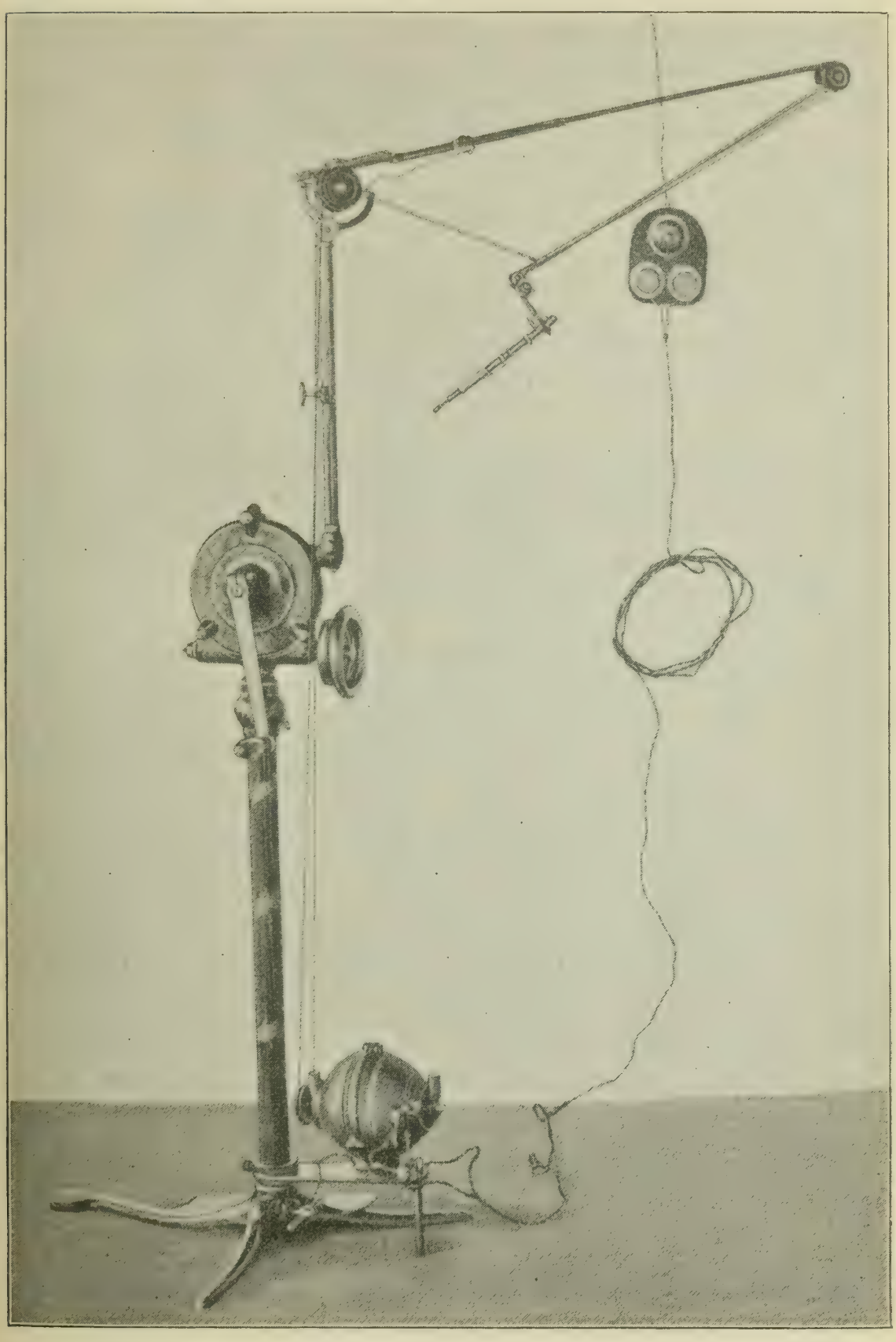
Surgical engines of several designs have been in use for many years, but, strangely enough, but few general surgeons appear to have availed themselves of the advantages to be derived through their use, preferring the use of hand tools—saws, gouges, chisels, mallets, hand drills, and heavy cutting forceps—for their operations upon the bones. There is scarcely an operation upon osseous tissues which could not be more quickly and accurately performed by means of the engine than with any of the hand instruments used. Many of these latter are crushing instead of cutting instruments. This singular preference has always appeared to me to be akin to a carpenter choosing hand tools where a molding machine is available.

Objections to some of the older forms of engines were not without good foundation. As they were chiefly notable for their faults of design and of construction, the deficiencies in mechanical performance might be accepted as a necessary evil, but the impossibility of complete sterilization was an objection not so easily disposed of. These serious drawbacks have one by one been corrected, until in its present form it combines all of the features described as requisites of a correct engine. It is simple in design, and accurately built, so that there is little liability of the mechanism getting out of order.

The performance of a series of operations upon the cadaver will readily give any dental surgeon a mastery of the instruments and mechanism. Like all other machines, some practice is required to give perfect control of it. The present form of hand-piece may be readily rendered aseptic.

So far as my personal knowledge goes, the first use of the engine in surgery was made by Dr. Harrison Allen in 1876, when he removed an osteophyte from the mouth of a patient by means of it.

When the late Professor Garretson founded the Hospital of Oral Surgery in Philadelphia, he obtained an enlarged and modified cord engine, turned by a crank. This engine was known as the Bonwill surgical engine. With all of its defects of design and construction, this apparatus was of marked service, and was the progenitor of the recent forms of the surgical engine, notably of the engine exhibited at the World's Columbian Dental Congress,



THE SURGICAL ENGINE IN ITS LATEST FORM.

in 1893. A description of this will be found in the proceedings of the Congress. Extended and accurate observation showed this engine to be too heavy and complicated to fill the needs growing out of an increased refinement and delicacy in modes of operating. It was not readily portable,—that is, it could not be readily taken apart and packed in a small case for shipment; the hand-piece was not of a form which would permit of ready sterilization, and would not carry an instrument of thick enough shank to prevent vibration in certain classes of operations.

The present engine is new in nearly all of its features; it is simpler in design, lighter in construction, and its parts are readily detachable to permit taking apart to pack in a small case,—a box not larger than those made for croquet sets. The hand-piece is designed with a two-fold object,—first, with reference to the mechanical; second, with regard to the pathological elements involved. It is sufficiently rigid to carry its tools steadily while operating upon dense bone, and may be readily rendered perfectly aseptic. This latter point is repeatedly emphasized because of the serious objection to previous hand-pieces involving the existence of spaces which commonly retained septic matter. That portion of the engine which transmits the power from the large wheel to the pulleys of the hand-piece requires no description other than shown in the illustration. The engine is driven by an electric motor of one-sixth horse-power.

For office practice, and when driving by electricity, the upright shaft from above the crank and the "arm" may be attached to a bracket. This plan is excellent when the engine is used in bone surgery of the nasal fossa or other light surgery about the face or ears; but for hospital and heavy work it is better to use the stand, as it can be moved about to suit the convenience of the operator.

The hand-piece has undergone complete change in order that the several appliances used can be made absolutely aseptic throughout the operations. All that portion of the instrument which includes the hand-piece and its wrist-joint attachment, except the cord, can be thoroughly boiled under pressure. The hand-piece proper is detached from the pulley after the parts have been sterilized; the pulley is adjusted and the cord placed in position; the hand-piece or pieces are, after sterilization, placed in a tray containing a carbolic acid or lysol solution until used. When the surgeon is ready to use the instrument, his assistant holds the pulley attachment in such a manner that the hand-piece can be adjusted without the hand coming near the cord or that portion upon which it works. For ordinary surgery one hand-piece is quite sufficient, as any number of instruments can be easily adjusted by opening the key latch and inserting the sterilized instruments, which are also placed in a tray containing the sterilizing solution. For opening the brain-case it is preferable to have two hand-pieces,—one with a small trephine and one with the spiral osteotome and guard adjusted. It saves time, an element of some importance in these operations.

Among the various uses for which the surgical engine is well

adapted is the removal of carious portions from almost any of the bones of the body. This may be done without the danger of injuring the surrounding tissue, for, when properly manipulated, operations may be performed without injury of the periosteum of the bone operated upon.

The engine has also been most successfully used in mastoid and other operations on the temporal bone and upon the nasal fossæ; also for removing caries and necrosis of the maxillary bones. The removal of even the greater portion of these bones may be accomplished without external incisions, which gives greater advantage over the older methods of operating with the cutting forceps and saws, as the parts are left smooth and rounded, not jagged and roughened.

The engine has also been used extensively in opening into the inferior dental canal, or cutting through the ramus of the inferior maxillary bone to reach the inferior dental nerve; also in opening through the superior maxillary bone or resection of the second division of the fifth nerve.

Another office which the engine has been called upon to fill is the opening of the brain-case, with the absolute certainty of not injuring the brain or its covering membranes.

In October, 1893, the surgical engine was first used in the operation for removal of the Gasserian ganglion by Professor W. W. Keen, for report of which see Transactions of the Philadelphia Medical Society for 1894, or the DENTAL COSMOS of January, 1895. The patient is here presented for your inspection. In this case a revolving saw, with guard, was used to cut the outer table and diploë, the inner plate being broken through by mallet and chisel.

During the discussion of the report of this operation before the Philadelphia County Medical Society, Dr. John B. Roberts made the following remarks: "With regard to this elaborate instrument, it seems to work very satisfactorily, yet for my own work I should rather use a sharp chisel with my own hand and my own mallet than any mechanical device. These are apt to get out of order, and must be at some place where they can be kept in order. What we want to do is to train our own hands to do the work, and not be dependent upon any mechanical device." This statement indicates to me a false position with regard to this class of instruments which ought not to go uncorrected.

With all due respect and admiration for the ability of Professor Roberts, I am a little fearful that surgery would take a backward step if all its mechanical devices were done away with. I heartily agree with him when he says, "What we want is to train our hands to do the work," and I would strongly advocate the highest possible attainment of manual skill as a necessary prerequisite in the performance of all surgical operations; but when he adds that we should "not be dependent upon any mechanical device," I am inclined to take issue with him, on the ground that his statement is contradictory, from the very fact that he himself advocates the use of a mechanical device, albeit a very crude one, in the shape of a mallet and chisel.

This machine is not nearly so complicated as the most simple sewing-machine, yet men and women run that; and who would say, Go back to the ordinary needle, and do away with the sewing-machine? And again, men have walked from Philadelphia to New York, have gone by canal or the stage; but to-day, if one wishes to go there with as little trouble and fatigue as possible, he takes a Pullman car on the "limited express." After using a dental or surgical engine for eighteen years, in all kinds of bone operations, I consider this engine as far in advance of chisel and mallet in bone surgery as the Pullman car is above the canal boat in traveling.

It was decided during the operation referred to for removal of the Gasserian ganglion, and after a series of carefully-conducted experiments upon the cadaver, that the danger of wounding the membranes of and even the brain itself had not been altogether obviated. This insecurity was partly due to the fact that brain-cases vary in thickness, and even the individual skull is thicker in some parts than in others, thus making it impossible to use a fixed guard, working from the outside of the skull. It was desired to cut entirely through the bone down to the dura mater with the engine, thus avoiding the use of the mallet and chisel, and after many trials with various burs, saws, etc., the following arrangement was devised, which has completely filled the requirements, as many brain-cases have since been successfully opened with it: The cutting portion of the instrument is called a spiral osteotome; it is one-half inch in length, one-eighth of an inch in diameter, and tapers slightly from base to point. It is divided by three spiral grooves, each having a turn of 120° through the half-inch from the base to the point of the cutting end, the arrangement of its three blades giving it the appearance of a twist drill.

The point of the bur, when in use, is guarded by a button-like attachment, connected with the nose of the hand-piece by means of a shank and collar. The free end of the bur is doweled into a seat in the guard, in which it revolves, which steadies the whole arrangement when in use, gives an added rigidity to the bur-shank, and holds the bur and guard in permanent relationship to each other.

The principle involved in the instrument described is simply that of a saw arranged to cut in a line with the axis of the shaft of the bur, and not at right angles to it, as in the circular saw. Such an arrangement allows of cutting in any direction and upon curved lines. This feature is especially valuable in resections of the brain-case, inasmuch as fenestra of any desired shape or size may be speedily made.

The mode of opening the brain-case by means of the spiral osteotome is as follows: After division of the soft tissues by the scalpel, a small opening is first made with a trephine mounted in the engine hand-piece; this trephine has a diameter of five-sixteenths of an inch, and is passed completely through both tables of the skull and the button of bone removed. There is no danger of injuring the dura with the trephine if it be carefully used by one who has had a little training with the instrument upon the cadaver.

The opening thus made affords a means of entrance for the osteotome, with its protecting guard, which is next inserted in the opening, and the section made along the lines previously determined by running the engine at high speed and forcing the bit laterally in the direction desired.

The button-like guard at the point of the osteotome absolutely prevents injury to the dura, which is pressed or dissected away by it from its attachment in the lines of the cut as the instrument progresses.

The instrument as a whole is designed not only with reference to the mechanical requirements imposed by the dense tissues which are to be operated upon, but in full recognition of the demands which the later developments of bacterio-pathological research have made a requirement in all surgical procedures, viz: rigid asepsis of the instruments used.

Continuous Gum.

BY L. P. HASKELL, CHICAGO, ILL

Continuous gum is, par excellence, the denture of to-day. The strongest, most durable, most natural in appearance, most healthy to the oral tissues, and most cleanly of all full dentures.

The matter of weight I do not consider a factor in making an upper denture. If the case be properly made and adjusted in the mouth, the patient does not realize whether it weighs a pennyweight or an ounce. This I can affirm after forty-three years' use of the continuous-gum denture.

The impression should always be taken in plaster. No vacuum chambers nor suction devices of any sort are needed. Cases may be made for the flattest, ridgeless jaws and the highest vaults. The only change in the model, as a rule, is a "relief" over the hard palate of a thin film of wax, extending well onto the anterior ridge and nearly to the posterior margin of the plate, so as to prevent rocking of the plate.

In this work, as in all others, the plate should be worn as high as possible, over the cuspids higher than elsewhere. The margin should always be wired with a flat wire soldered edgewise to the plate, beginning at the right side and soldering an inch at a time, making a *close* joint. This is easily done, using common iron wire for clamps, clamping at two points at first. The posterior margin of the plate should be reinforced with a doubler, one-quarter inch wide, gauge 30, extending around the tuberosities. The inner margin of the doubler should be turned up a very trifle, to protect the margin of the porcelain. This turned-up edge should extend only to the top of the ridge, where it is met by the wire of the outer rim. The doubler should be soldered first. The wire should not run across the heel, as it is unsightly and unneces-

sary. A mere trifle of borax is needed simply to guide the flow of the solder. The solder should always be twenty-four-carat gold.

In arranging the teeth the roots can be cut off when necessary with side-cutting pliers. Little grinding is needed, just sufficient to let the tooth rest on the plate.

Invest in plaster and asbestos, equal parts, first applying a thin coat of plaster to the teeth, filling the interstices. After removing the wax, make patterns of lead (Japan tea lead is the best) in three sections, one covering the anterior teeth and the others the posterior, but lapping over the cuspids, so when soldered it is a continuous backing, firmly anchoring the teeth to the plate. There should be a foot-piece to the backings about one-eighth inch wide, lying flat on the plate. The backings may be the same thickness as the plate. By slitting the foot-piece several times it can be the more easily adjusted. For pressing the backing into place I use a worn-out rubber scraper. Use very thin twenty-four-carat gold for solder, cut in pieces three-sixteenths inch square, picking it up with a sharp-pointed instrument. No borax is needed, as the gold is laid under the foot-piece and under the pins, which are bent down close to the backing.

When using a coke or oil furnace, I soldered in the furnace. Since using the electric furnace I heat the case as hot as possible over a gas heater; then solder with the compressed air or an automatic blow-pipe. When cold, remove the investment after soaking; wash thoroughly; no soap or alcohol is needed.

I use the Close materials for body and enamel exclusively, as they are thoroughly reliable. The first application should be made very wet, so as to be easily worked into all the interstices around and under the teeth back of the backings, jarring with the spatula, and absorbing with a cloth all excess of moisture. Absorb with the cloth most of the moisture from the material in the dish, and apply with the spatula (which is straight and pointed at one end, curved and pointed at the other, and the only steel instrument needed), holding the case upside down. The material should be packed hard, building up to the full contour, always fullest over the cuspids; jar with the spatula to bring excess of moisture to the surface, and absorb; then dry partially over the Bunsen burner or spirit-lamp. For trimming and contouring, nothing equals a quill toothpick, thin and flexible, which trims around the necks of the teeth and removes all material from between. With a stiff, dry brush remove all chips, and with a small, soft camel's-hair pencil, wetting for each tooth, deftly draw it around the neck of each tooth.

With the curved end of the spatula apply the material to the palatal surface, packing thoroughly around the necks of the teeth, and a very thin coating over the surface, jarring, absorbing, drying, and trimming. Here taste can be exercised in making the lingual necks of the bicuspids and molars longer than the teeth represent, and also convexing the surfaces of the bicuspids to correspond with nature.

This first application of the material should be as complete as if it were the last, as the material shrinks, and the shrinkage should be complete at this baking.

The introduction of the Custer electric oven has simplified this work very much. The case is placed in the furnace without drying, and the heat turned on slowly. This should not be a full bake (glossy), but only a strong glaze.

The case should always be placed on the plaster cast after soldering and also after the first bake, to see if it has sprung; if so, press it back into place. There is no liability of springing in the last bake. When cool, wet the case thoroughly, and apply material very wet, jarring thoroughly to fill the crevices; then with denser material replace the shrinkage, form the rugæ, finish as at first, and bake this time to a gloss.

Upon cooling, apply the gum enamel, of a consistence to be applied with the spatula, about one thirty-second inch in thickness, and uniform; jar slightly and absorb; dry partially and trim with the wet brush around the necks of the teeth. The palatal surface needs a thinner coat than the labial. Bake to a *gloss*. The case can always be placed in a cold muffle to cool. Finish with files, fine sand-paper, small felt wheels with pumice and oil, and finally soft brush and whiting or rouge.

The next best furnace is the Revelation oil furnace, and then the old coke furnace, which always does good work.

A lower plate should be doubled around the margin one-eighth inch wide and no wiring, allowing the porcelain to come flush with the edge. The reason for this is the liability of needed relief at the margins sooner or later; the case would not *appear* marred, as it would if ground or filed through a wire.

Many have given up the use of continuous-gum work on account of the difficulty they had in repairing. If properly proceeded with, this is a simple matter. The case must first be imbedded in plaster and asbestos one-half inch deep, heated very slowly to a red heat. When cool, and the investment removed, there is no danger of cracking.

Grind out the remains of tooth to be replaced and a portion of the gum. Select a tooth or teeth (rubber teeth are suitable for repair). No soldering is needed.

If only one tooth, pack some material (lower fusing than the original) around it, and carefully place in the furnace; bring up the heat gradually to a good glaze. After cooling, apply the enamel. If several teeth are replaced, hold them in place with a light coat of plaster and asbestos over the ends or half-way down and extending onto the adjoining teeth.

If only the corner of a tooth is broken off, repair with the easy fusing material. If there are cracks in the enamel, grind into them and fill with body.

Cataphoresis and Electrolysis in the Treatment of Peridental Inflammation.

BY JOHN M. FOGG, D.D.S., PHILADELPHIA, PA.

Notwithstanding the fact that the original experiments in cataphoresis had for their object other lines of local medication, all, or nearly all, of the recent investigations and developments of cataphoric medication have been in the line of anesthetizing sensitive dentin and of bleaching teeth. As a consequence of this tendency, a very important application of the principles of cataphoresis and electrolysis has received too little attention. I refer to the inflammations in the peridental region arising from various causes, and the gratifying results to be met with in their treatment with the help of the electric current. The most frequent of these conditions is probably that of chronic pericementitis, the cause of which is so often found in the imperfect sterilization of root-canals at the time of filling. By the introduction of antiseptic agents, cataphorically, through the canals we have at once a remedy for this condition. It matters little which antiseptic we employ, so long as its conductivity of the current is favorable. I have used for this purpose hydrogen dioxid, oil of cassia, chlorid of zinc, and a solution of acetanilid,—all with equally good results. The method of procedure is practically the same as that for the anesthetizing of sensitive dentin. After applying the dam or napkin, the cavity and canals are flooded with alcohol and thoroughly dried. A pledget of cotton saturated with the antiseptic to be used is placed in the cavity, and the platinum point of the positive electrode placed upon it. The tooth being devoid of sensation, the current can be raised to the necessary strength in a very short time. An application of from fifteen to twenty volts for about fifteen minutes has been found sufficient. This is followed by an application of iodin (also cataphorically) to the gum for a few minutes, and in no case has a second treatment been found necessary to allay the pain and inflammation and place the tooth in a condition favorable to filling.

The treatment of alveolar abscess by electrolysis of a metallic electrode, after the plan suggested by Dr. W. J. Morton, is an important consideration. A small elongated bulb of zinc is fused onto a platinum wire which, in an insulated handle, forms the positive electrode. This bulb should receive a coating of mercury before each application. It is then inserted into the fistula or incision, the negative electrode held in the patient's hand, and the current applied. The electrolytic action of the current dissolves a small portion of the zinc bulb, and we have deposited within the abscess-cavity a quantity of the chlorids of mercury and of zinc. If the application of the current causes pain, a few drops of a cocain solution may be taken up on the zinc electrode and introduced with it into the opening. Cataphoric anesthesia is thus obtained in combination with the electrolysis. By this method abscesses, long chronic, may be cured with two or three treat-

ments. In the treatment of pyorrhea the electric current is a valuable acquisition, both as a means of intensifying the action of such agents as are used in the treatment of that condition and for the stimulating action of the current itself upon the tissues. In illustration of the foregoing methods of treatment, I submit the records of a few cases:

Case 1.—A lower molar had contained a large crown filling for a number of years. Last summer during the patient's stay at the seashore pulpitis developed, and the filling was removed and the pulp destroyed by the seashore dentist. A few hours after filling, however, severe pain occurred in the region of the tooth, and was relieved only by the removal of the filling. A few days later another filling was inserted with the same result. This process was repeated three or four times, until finally the attempt to save the tooth was abandoned. When I saw the case in the autumn the tooth was very loose and sensitive to pressure, the gum inflamed and swollen. An application of hydrogen dioxid was made as described above, followed by an application of iodin to the gum, and the canals and the crown cavity were then filled. In two days the soreness and inflammation had subsided, the tooth had become firm in its socket and could be used with perfect comfort, and after an interval of five months remains in the same satisfactory condition, having given no trouble in the mean time. Attention is called to the fact that, previous to this treatment, a filling was not tolerated in this tooth for more than two or three hours at a time.

Case 2.—Presented conditions very nearly the same as the foregoing, with the addition of a chronic abscess. This was treated through the canals in the same manner and the iodin application made to the gum, with the same favorable result. This tooth had been condemned to extraction before this treatment.

Case 3.—Necrosis in the alveolus of an upper bicuspid, the result of a chronic abscess. The fistula was enlarged with carbolic acid, and the cavity cleansed. Cotton was then wound on the platinum point of the positive electrode, saturated with aromatic sulfuric acid, and applied within the fistula. A current of twelve volts was used for ten minutes, an antiseptic dressing made, and the case dismissed. Upon the next examination, two weeks later, the fistula was found to have healed and the tissues presented a healthy appearance. The patient told me that this case had resisted other treatment for nearly a year.

Case 4.—Chronic alveolar abscess, upper bicuspid. After syringing with hydrogen dioxid, the zinc electrode was inserted in the fistula and a current of fifteen volts applied for ten minutes. This application caused slight pain, which soon disappeared. At the next visit, a week later, the case presented marked improvement. The swelling had subsided and the fistula was nearly closed. An application of iodin was made to the gum to reduce the slight inflammation which still existed, and at a subsequent visit a cure was found to have resulted.

One other instance in which cataphoresis was found to be of especial value was in a case of facial neuralgia, and while it is not strictly within the limits of the title of this communication, seems to possess sufficient importance to justify its mention.

The patient had for some time been under her physician's care for a violent case of facial neuralgia, which treatment failed to relieve. About a year ago the pain having to some extent become localized in the maxillary region, she was advised to consult a dentist. A very careful examination failed, however, to reveal any dental disorder, and she returned to the physician. From that time until within two or three months, her suffering had been incessant. Another dental examination was made with the same result as the first. The pain was centralized in the right superior

maxilla and was reflected to the inferior maxilla, the orbital, the temporal, and the occipital regions of the right side. A neuritis of one of the dental branches of the superior maxillary division of the fifth nerve was diagnosed, and a cataphoric application of tr. aconite was made on the gum over the upper first molar, using the rubber cup electrode. On the following day the pain had disappeared, nor has there been any recurrence. The details of one case afford rather insufficient grounds upon which to base any positive statement as to the value of any method of treatment, but the case in question was such a typical one, the result so decided, and the cure effected so apparently permanent, that the writer deems it worthy of consideration.

A Case of Herpes Zoster, associated with Dental Trauma.

BY JAMES S. GILLIAMS, M.D., D.D.S., PHILADELPHIA, PA.

Before referring to the case which I propose to describe, a few preliminary remarks may not be inappropriate. Herpes zoster, also called zona and shingles (a corruption of the Latin word *cingulum*, a girdle), is an acute inflammatory affection, characterized by a group of vesicles along the course of the cutaneous branches of the fifth cranial and the various spinal nerves. Neuralgic pain, heat, and redness of the skin precede the vesicles, which, varying in size from a pin's head to a mammoth vesicle, appear in distinct groups or coalesce in irregular patches. At first these vesicles contain clear fluid, later becoming turbid, until at the end of the week or more they dry up and brown scabs drop off, leaving decided and often disfiguring scars.

The disease is usually unilateral, but many bilateral cases have been recorded. The pathological conditions of this affection, according to many observers, are certain changes in the nervous system, mainly redness, inflammation, swelling, and hemorrhage into the ganglia or the nerve itself; or, in other words, the irritative causes may be peripheral, in the nerve, in the ganglion, or in the spinal cord itself.

The knowledge of the cause of the herpes zoster seems to be far from precise. A certain number of cases seem to have a peripheral origin in some irritative lesion.

I have recently had under my care a patient suffering from facial herpes zoster which followed the course of the several cutaneous branches of the fifth nerve on the left side, and which apparently was caused by a vital cuspid on the same side which was loosened and the seat of pericementitis.

Mr. S., aged fifty-five years, had for some time been suffering discomfort from a left cuspid, which was so loose that he tried on November 2, 1896, to remove it by rocking it to and fro, but suddenly he desisted in his efforts, as he believed he "felt the nerve break off in the socket of the tooth." About forty-eight hours afterward he was annoyed by a strange sensation, as of an insect crawling over the left temple, but upon putting his fingers upon

the spot he found that the sensation was due to several small elevations of the skin. In a short time they became painful and increased in size and number, spreading rapidly over the left frontal and parietal regions, being especially marked on the forehead. There the eruption assumed a zonular form, being about the size of a silver dollar, and the center of the forehead was greatly swollen. It was remarked that the eruption was confined to the left side of the median line. Soon afterward the left eyelids began to swell; they became reddened, and a similar eruption appeared upon them. At the same time the left eyeball became reddened. The patient and his friends thought he was suffering from erysipelas, and as the pain in the forehead and left side of the head became intense, his family physician was called in to see him on the 9th. He found that Mr. S. was suffering from "a very severe attack of herpes zoster," but although the doctor recognized the fact that the herpes was probably somehow connected with the diseased condition of the cuspid, he deemed it safer to defer extraction of the tooth until the acute symptoms had somewhat subsided. The case responded to general and local treatment, and at the end of another week the offending tooth was extracted and the patient made a rapid recovery. During the progress of the case the vesicles burst and exuded a yellowish discharge; they then dried up, forming yellowish-brown scabs, which fell off. At the end of six weeks there remained on the left temple near the outer angle of the eye a large reddened, half-healed patch of skin which testified to the pronounced character of the inflammation which had existed. On the forehead a circular cicatrix was plainly visible, and there was also a minute scar upon the left upper eyelid.

The diagnosis of this case is one of considerable interest. It may fairly be assumed that the injury which the patient inflicted upon the anterior dental branches of the supra-maxillary nerve by his violent movements of the tooth set up a neuritis which extended first of all to the temporal terminations of that nerve, and subsequently involved the supra-orbital branches of the ophthalmic or first division of the fifth. The cutaneous branches of the supra-orbital nerve supply the integument of the cranium as far back as the occiput, and some of its branches are distributed over the frontal and parietal bones. From the excruciating character of the pain within the cranium and the inflamed condition of the eye, it is probable that the neuritis affected not only the peripheral terminations, but also the trunks of the supra-maxillary and ophthalmic branches of the fifth nerve.

CORRESPONDENCE.

"THE RELATION OF THE FRONTAL SINUS TO THE ANTRUM."

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In the DENTAL COSMOS for November, 1896, there is published a paper read by Dr. Fillebrown, of Boston, at the annual

meeting of the American Dental Association of 1896, entitled "A Study of the Relation of the Frontal Sinus to the Antrum."

Inasmuch as the author refers to certain studies of mine, I wish to correct what appears to me to be an entire oversight or misunderstanding by him of what I said in an illustrated paper read before the same association at its annual meeting in 1895 and published in the DENTAL COSMOS for January, 1896, a discussion of the same following in the February number of that year.

After describing four cases of antral [maxillary sinus] diseases, Dr. Fillebrown says,—

"I was led to conclude that there must be a very much more intimate relation between the two cavities (frontal sinus and the antrum) than that described by anatomist or surgeon, for I could find neither an anatomist nor a surgeon who could give me the least encouragement that my surmise was correct.

"Dr. M. H. Cryer mentions, in his valuable paper read before this association last year, that fluid may enter the antrum from the frontal sinus, but he makes no mention of the intimate connection which I have observed."

In the discussion of Dr. Fillebrown's paper Dr. Barrett said,—

"Last year Dr. Cryer showed at the meeting of this association a large number of slides which were a revelation to most of those present. These showed that the infundibulum discharged into the antrum, or so near the meatus that it might discharge into the antrum."

Dr. Fillebrown answered,—

"Dr. Cryer did not show conditions like those exhibited here, nor did he say anything about them."

I quote from my remarks at that meeting as published in the DENTAL COSMOS, January, 1896, page 104:

"Slide No. 9 is a sagittal section made near the inner wall of the orbit. The frontal sinus is seen at the top, and below this is the inner wall of the orbit, os planum of the ethmoid, including the edge of inner portion of the floor, below which is the internal wall of the maxillary sinus.

"To locate the opening and the direction in which the excess of fluid would pass from the sinus, a wire has been passed backward into the hiatus semilunaris. A perpendicular probe passes through the upper portion of the opening of the sinus, which in this case is partly in its roof or at the angle of the internal wall and the roof; as the straight probe passes out of the antrum, it passes through the infundibulum into the frontal sinus, showing that fluids could pass directly downward from the frontal into the maxillary sinus. These are specimens showing where the anterior ethmoidal cells open just at the maxillary sinus. If the hiatus semilunaris should be closed by pressure of the septum or inflammation of the mucous membrane, the fluids from the frontal and ethmoidal cells would pass into the antrum.

"I had a patient during the past winter and spring who was troubled in this way, which caused a fistulous opening into the mouth. The sinus was treated for several months without success. The natural opening of the sinus was closed, as proved by forced injections into the fistular opening in the sinus. The fluid would not pass into the nasal chamber, and finally a large opening was made into the outer wall of the sinus, in order to make a better examination with the finger. There was found a small tumor just below the natural opening. A curved probe could be passed through the opening, in the direction of the frontal sinus. The tumor was then removed and a good-sized opening made into the nasal cavity, the patient recovering in a very short time.

"Slide No. 10 is from a similar section of a different subject. It shows the opening of the sinus, running upward, where a small portion of bone has been cut away."

In the discussion of my paper Dr. Barrett, among other things, said he—

"had examined the specimens of which the photographs had been shown by Dr. Cryer, and they were a revelation to him and had materially modified his views of anatomy. Many points are presented more clearly in the specimens themselves than on the screen. Probably every practitioner of large experience has had cases of disease of the antrum for which he could find no clear reason. In a case of this sort not long since he had operated, opening into the sinus three times, finally through the external alveolar process, until he could explore it with his finger, when he found nothing to account for the amount of discharge and disturbance in the parts. Since seeing these specimens of Dr. Cryer's, he is satisfied that there may have been a continuous discharge from the frontal sinus down through the infundibulum and the ethmoid into the maxillary sinus instead of the nasal."

Dr. Brophy expressed his opinion as follows:

"The relation of the frontal sinus to the antrum has never before been so conclusively shown as in these investigations of Dr. Cryer's, and he has the thanks of the speaker and of his colleagues for his work in this direction."

I fail to see why Dr. Fillebrown should so entirely ignore the facts in relation to this matter as set forth in my paper read at the meeting in 1895. He was there at the time, heard the paper, and also the remarks of Dr. Barrett and Dr. Brophy, who are on record for having clearly understood the point brought out by me, and which is the subject of this contention; he saw the slides that were projected, and later (in the spring of 1896) I sent him, at his request, the set of original slides used in illustrating my paper; certainly they furnished him ample material and opportunity for a study of "the relation of the frontal sinus to the antrum."

Some time after the meeting the paper appeared, fully illustrated, in the DENTAL COSMOS,—a journal, I have no doubt, he reads,—and it was also published in the Transactions of the American Dental Association. He claims that he could find neither an anatomist nor a surgeon who could give him the least encouragement that his surmise regarding "the relation of the frontal sinus to the maxillary sinus," was correct. One would suppose the exhibit referred to, with its accompanying explanation, would have furnished the desired encouragement. He does not specify what anatomists or surgeons failed to throw light upon his problem, but if he had asked men who are making special studies in this department, for example, Drs. Brophy, or Marshall, of Chicago; Dr. Barrett, of Buffalo, or Dr. Thompson, of Topeka, I am sure he could have received information that would have demonstrated that his "surmise" was correct. I was under the impression that I had made the matter of the relation of these two cavities sufficiently clear; indeed, a critical re-reading of my remarks in that connection tends to confirm that opinion, especially since it is evident that other specialists who listened to the reading of the paper grasped the point most clearly. Under the circumstances, the announcement of the discovery of this anatomical relation by Dr. Fillebrown one year after the publication of my statement of it appears to be somewhat anti-climax.

M. H. CRYER.

PROCEEDINGS OF SOCIETIES.

New York Odontological Society.

A regular meeting of the New York Odontological Society was held on Tuesday evening, November 17, 1896, at the New York Academy of Medicine, with the president, Dr. William Carr, in the chair.

Report of the Executive Committee.

Dr. W. W. Walker. The Executive Committee reports: In reference to the clinics, Dr. Gardiner, of Philadelphia, was here this afternoon and performed an operation on a central incisor. Dr. Steurer, of New York city, demonstrated the practicability of Steurer's gold, and Dr. Bonwill filled matrices with amalgam. All the gentlemen are here, and it is understood that those giving clinics before the Odontological Society shall make their own reports.

Reports of Clinicians.

Mr. William J. Evans. The investigation of water is a subject which has engaged chemists from the earliest time to the present. It may nevertheless be somewhat of a surprise to most of us to find that pure water, uncontaminated by organic matter or mineral substances, has really never been obtained. The text-books tell us that water, as we find it, should boil at 100° C., which would be 212° F.; but water has been procured which would boil only at 130° C., and it has been stated that if pure water could be obtained it would not boil at a lower temperature than 150° C. What we call water is, then, in the minds of even the chemists, so vague that the assertion which was made by the Kentucky gentleman, that water was a mysterious fluid about which nothing was known, is fairly true. The opportunity to do something with water occurs now with greater force than it did ten or twenty-five years ago, when less was known about antiseptics and fungi and the general preparation of such antiseptics as will be mentioned here. We have in the Pharmacopœia a number of waters, some of which were introduced prior to the time when the Sixth Pharmacopœia of London, in 1788, mentioned aqua destillata for the first time. We cannot prepare this, even with glass vessels, with a glass condenser, without finding that water is of such great solvent power that, when you have finished, the distillate has in it silicates dissolved from the glass. To have waters which would be available in relation to medicine, as condiments are available in relation to food, is really the object of the present investigation; and we have Latinized the words "herb" and "waters," making the word "aquerbæ," to apply to waters which shall be made from the Canada snake-root, from celery tops, from angelica, from summer savory, and from a variety of other pot-herbs which formerly have only taken a place in the culinary department of our houses and hotels. There is now an opportunity in the direction of having waters which will exercise this function in overcoming the

time-honored objection to medicine. These waters will in all probability make Dobell's solution such a preparation as will tolerate the more general use of carbolic acid and biborate of soda. I have here some aquerba serpentaria, which is most grateful and stimulating, and some aquerba apii (celery), which is very palatable for saline solutions, with both of which Dobell's solution has been prepared for investigation. The aquerbæ in some ten varieties was shown this afternoon, so that a just criticism of the work in this direction might be given. It has been the general opinion that in all probability this departure is an art as important as the art of perfumery. We hope that as a rinse in the dental office the aquerba serpentaria will, in the mouth, be more pleasant than the present forms of dentifrice. The aquerba sinapis, a solution of essential oil of mustard, 1 in 5000 of water, gives a stimulating effect which you could obtain only by using whiskey. If you have a patient who has had too much cocain, or who has been three or four hours in the dental chair and has become faint, the stimulation which you can get from the aquerba sinapis would be a great benefit. By the addition of a little aquerba apii (celery), the morning laxative is greatly improved in taste, and it can be made harmlessly stimulating by adding a little aquerba sinapis. These solutions and aquerbæ are only presented for your investigation. It may be a month or so before McKesson & Robbins can offer the profession any of them except for experimental purposes.

Dr. J. A. Steurer. This afternoon, at a clinic, I exhibited the working qualities of my plastic gold. This form of gold is known to a great many of you, because it has been before the profession for the last ten years. It is chemically-pure gold in a plastic state. When I say chemically pure, it is really so; it is as pure as chemistry can make gold,—as near as we can make gold 1000 fine. On account of this it has plastic properties and is extremely cohesive, and fillings can be made in a much shorter time than by any other form of gold, by simple hand pressure. We can get a harder filling by simple hand pressure with this form of gold than we can with foil by means of a mallet. I exhibited a number of specimens to demonstrate its adaptability to the walls of the cavity, and all agree that it was perfect. Another method that can be used in filling with this gold is in cases of large cavities, where you wish to have the good properties of a gold filling, but at the same time, wishing to save time and expense to the patient, you can fill the cavity about three-quarters full of amalgam, and at the same time finish the filling with this gold at one sitting. The first few pieces will turn white, taking up the excess of mercury; but as you go on toward the surface you have an absolutely pure gold filling, because the excess of mercury being taken up, there is nothing left to work but the pure gold. This forms a very hard filling. You can finish it off at the same sitting, and so save considerable time. I think the time has arrived, according to the number of experiments that have been made by dentists all over the world, for a fixed place for this sort of gold in saving pain, time, and inconvenience not only to the patient, but also to the dentist.

Dr. NORTHROP. Before the gentleman takes his seat, will he be kind enough to be a little more explicit in regard to the use of his gold with the amalgam? This afternoon I saw that he had a matrix upon the tooth, and the explanation he gives would not call the attention of the profession to that one point. His matrix, as I take it, held the amalgam in place to prevent it from crumbling, etc. Also in regard to the condensing of his plastic gold, if it does not take about as much time to condense it around the walls of the tooth as any other gold?

Dr. STEURER. In crown cavities, of course, you need no matrix. You fill three-quarters of the cavity with pretty dry amalgam, so as to have as little excess of mercury as possible; but in approximal cavities you use a matrix of some metal that is not apt to be attacked by mercury. This afternoon I used a piece of aluminum; thin steel will do just as well. This method originated with Dr. Clapp, of Boston, who has been practicing it for many years. The gold should be used with proper instruments, which, instead of being perfectly flat, are slightly oval, with fine serrations. The property of this gold, spreading until perfectly condensed, insures to a great extent its adaptation to the walls of the cavity. But every gold, no matter in what form,—even foil,—ought to have all the edges around the cavity condensed with finer instruments, so as to be perfectly sure.

The one special property that I insist upon is that this gold spreads. We have a number of forms of gold of similar character that work very nicely, except that they have the great fault of condensing immediately under pressure, and do not spread, and as a consequence ball up and draw away from the cavity. I want to call attention to this one special feature of my gold, besides its easy, soft, velvet-like sensation under the instrument.

Dr. GARDINER. My clinic was simply the packing of the gold with the electric mallet,—a subject that every one is familiar with,—so I do not think there is very much of a report to make. I do not know that I had any peculiar method. I filled a small corner of a central incisor.

Dr. BONWILL. I came here at the invitation of the society to show the use of Abbey's soft foil and also his cohesive foil; but inasmuch as there were some gentlemen present who wanted me to show how I filled teeth with amalgam, I did so. It is useless for me to state how I fill teeth with amalgam. It has been seen over and over again. To-day, after twenty-five years I have spent with electric mallets and dental engines, I use more amalgam than I ever did.

In regard to the electric mallet, while I do not use it any longer, I came particularly to see Dr. Gardiner use it. I differ with him in the use of filling instruments. He uses rough ones and much hand pressing where I would use smooth ones and no hand pressure. I exhibited the electric mallet at Dr. Lord's house twenty-five years ago, and it pains me to think that the dental profession have to be taught at this day how to pack gold thoroughly with it. It was demonstrated by me in 1875, in Philadelphia, when the elec-

tric mallet was first shown there, that it would pack one-sixth more into a given cavity than any other instrument that was used, and upon a yielding cushion.

Dr. W. W. Walker. I would like to state that it was with the greatest difficulty that the committee was able to obtain this head that Dr. Cryer might practically demonstrate the use of his engine. Had it not been for the friendly feeling that exists between some of the members of the medical profession, especially those who teach practical anatomy, we would have been unable to obtain it. I hope you will allow the committee to thank personally the two professors who were instrumental in obtaining this head for us.

Dr. M. H. Cryer, of Philadelphia, then read the paper of the evening, entitled "The Contributions of Dentistry to Surgery."*

Discussion.

Professor R. F. Weir. I am only too pleased to express my gratification at seeing this instrument to-night. It far exceeds my idea of its capacities, and I was specially impressed with the satisfactory way in which the deviser of the machine performed the operation. The only weak point I see is the use of the preliminary trephine opening. It is liable even in experienced hands to do damage to the dura and the brain, for I have used the trephine with the electric motor a number of times, and I have found sometimes I could avoid injuring the dura and sometimes not. Entrance, however, being once made into the skull,—I should prefer for this the Flower hand trephine,—I see nothing to prevent the use of the instrument, and I hope soon to have the opportunity of using it in the New York Hospital. Something of this kind is of great value. I feel that I cannot add anything more except to renew my thanks to the exhibitor and to the society for the opportunity of being present at this demonstration of the ability of the improved machine.

Dr. G. E. Brewer. My experience in this department of surgery has been rather limited, but it strikes me that this instrument is by far the most satisfactory one I have seen for opening the cranial cavity. An important question, however, arises in my mind, and that is, would it be possible, with this instrument, to make an oblique cut through the bone, so that the edge of the bone-flap would be beveled? as it is important, in replacing the bone, to avoid a depression of the flap below the surrounding portions of the skull. In the operation shown to-night this was not done, but I see no reason why it could not be accomplished. It is certainly of advantage to save time in these operations. In the cases upon which I have operated it required from ten to fifteen minutes to remove an omega-shaped flap of bone three inches in diameter. With this instrument the same work can be done in two or three minutes. I think with Dr. Weir that if more safety could be insured against wounding the dura by the preliminary trephine

*For the paper in full, see page 102 of the current number.

opening, the value of the instrument and method would be enhanced.

Dr. CRYER. My experiments on the cadaver were not, at first, encouraging; the instrument seemed inclined to slip, and would not cut as I wished, but after a little practice this difficulty was overcome. The hand-piece should be held like a pen, with the third and fourth fingers resting upon and near the parts to be cut, which should also be firmly held. In using the spiral osteotome, the third and fourth fingers do not rest upon the head. Mechanical guards can be used to prevent the danger of the trephine plunging into the brain, but by holding the instrument properly one who is accustomed to operations upon the cranium can, by a little practice, operate with safety without the guard, and even tell, by feeling alone, what kind of bone-tissue he is cutting or when nearly through the walls of the skull.

When it is desired to return the flap of bone, and also in working with the skulls of ordinary thickness, I would not recommend the use of as thick an osteotome as I have used on this negro's very thick skull; by using a thinner one the kerf would not be so wide. It is well in some cases to use an irrigating bottle, which keeps the parts clear while being cut.

The instrument has been successfully used in making artificial sutures for children whose natural sutures have fully ossified and prevented the expansion of the brain and the enlargement of its encasement. In this operation, make the lineal incision in the integuments for the longitudinal suture, a little to one side of the median line to avoid the longitudinal sinus. Then it is well to trephine at the anterior and posterior ends of the line to be cut, when the instrument can be inserted at the end most convenient and cut to the other opening. If an artificial fronto-parietal or occipito-parietal suture is desired, then the instrument should be entered at the anterior or posterior trephined opening and carried in the direction desired. The instrument has been passed between the longitudinal sinus and the bone without injury to the former. The guard will push an artery or vein out of its groove in the bone; but should the artery be inclosed in a canal, as is sometimes the case with the meningeal arteries, the osteotome will cut the vessel.

Dr. BLACKMAN, Brooklyn. While my experience in brain surgery has been exceedingly limited, I will say that I have seen some operations performed by Horsley, of London, who as an authority is perhaps unquestioned. I have never seen anything so complete for operations on the brain case as this instrument and its appliances. Mr. Horsley has discarded the mallet and chisel entirely, and depends upon the hand trephine and bone-forceps of his own design. One unquestionably needs to learn how to handle the instrument. You cannot use the old trephine successfully without knowing how to handle it. I think this instrument would be particularly useful in forming new sutures, as Dr. Cryer has just said, and especially in cases of operations for allowing expansion of the brain-case, in cases of idiocy, where a new suture can be formed without the removal of bone, by making this strip.

Dr. JOHN B. WALKER. I will simply say that I was very much pleased with the machine. I appreciate very much the saving of time by its use. I do not think there is anything further, unless the drill could be made smaller. I suppose that could not be done and still have the same strength.

Dr. B. F. CURTIS. I have been very much interested in this instrument. I think possibly one reason why the small trephine is not so apt to cause injury to the dura is on account of the size, as the large trephine is more likely to cut too deep at one edge. The great advantage of this method of opening the skull is avoiding the shock from the repeated blows of the mallet upon the chisel, which is a serious item, and also the great saving in blood, because the bone would be lifted out so rapidly that the vessels of the diploë, which give us so much trouble and from which the patient may lose a couple of ounces of blood in the operation with the hand trephine, would not have time to discharge so much blood before they could be reached and plugged. There would be a saving of blood as well as of time.

Dr. S. G. PERRY. It seems to me there is one point made by Dr. Cryer which should be emphasized. I do not suppose there is a dentist present who does not know perfectly well that those burs, however sharp they may be or however coarse their blades may be, when revolving do not cut on the soft as they do on the hard tissues. I have often quieted a patient who was afraid to have me use the bur, by revolving a small bur between my fingers. Of course it would not hurt the soft tissue, but that would not be the case if you touched the nail or the bone. I believe one can readily feel when one is nearly through the bone, and that the sense of touch would be a better guide than anything else. Any one who has had any experience with the dental engine must know what I mean, and what Professor Cryer means when he says he can tell when he is almost through the bone.

Dr. JARVIE. There was one point in the paper that attracted my attention, which related not so much to the use of the engine as to its history. I think Professor Cryer said the first knowledge he had of the dental engine being used for surgical purposes was in 1875. A year prior to that, Dr. Arthur Mathewson, of Brooklyn, an oculist and aurist, came to me and said he had a patient who had an osseous tumor in the meatus. He thought I might have some cutting instruments that were finer than anything he had. I suggested the use of the dental engine, and made a number of burs, taking the ordinary fissure bur and grinding it to the desired point. The operation was performed by drilling with a fissure bur through the center of the tumor, then using a larger bur of the same kind; into the opening thus made a round bur was passed and the tumor burred away from the center outward. That was certainly twenty-one or twenty-two years ago. The operation was successfully performed, the patient's life saved, and the hearing restored. I am speaking from memory, but while I think I am correct, the date may not be exact.*

*Examination of the records shows that this operation was performed

Another very valuable use to which this surgical engine could be put, and which has not been spoken of, is in removing necrosed bone, either of the long bones or in any part of the body. With large burs in the engine, the necrosed bone could be burred away and the soft tissues disturbed but little. Certainly the simile that was used in the paper between the difference of going to Philadelphia from New York in a Pullman car or a canal boat would be applicable to the removal of necrosed bone by the use of the engine in comparison of performing the same operation by the ordinary method.

Dr. Cryer. If in operating there are any sharp edges or points of bone left, as is sometimes the case in the removal of the superior maxilla, the finger can detect them, and the instrument can be carried in along with the index finger and the roughness can be cut away. The instrument will not cut the finger unless it becomes caught between it and the bone. Crevices were left by the old-fashioned method of removing the superior maxillary bone, and germs of disease had ingress into the parts; but by the use of the engine these rough and deep depressions are avoided, leaving the parts even and smooth.

Adjourned.

John I. Hart, D.D.S.,
Editor Odontological Society.

First District Dental Society, State of New York.

Meeting of October 13, 1896, concluded.

Following is the conclusion of Dr. J. N. Farrar's paper; the first two instalments were published in the Dental Cosmos for December, 1896, and January, 1897:

Esthetics in Dentistry.

As we all know, "Regulating Operations" range from minor to major. As illustrative of minor operations, I here show a few cases of upper central incisors that required turning, and the mechanisms used. In the first two cases both centrals were poised so as to present in front a V outline. (Figs. 12 and 13.) In the correcting process both teeth in each case were turned simultaneously.

The mechanism for the first case consists of a screw, with a nut, and two broad but very thin ferrules. Upon the labial surface of each of these ferrules is soldered one extremity of a stiff, narrow

in May, 1876. It was reported in full by Dr. Mathewson before the first Congress of the International Otological Society, held in New York, September, 1876, and is published in the Transactions of that Congress, pages 86-96.

In a note received to-day from Dr. Mathewson he says, "The report of the operation received very flattering notices in the medical journals and reviews, both here and abroad, has been mentioned in every standard work on the ear published since, and this method of dealing with those bony growths in the ear has been generally followed."

strip of gold plate, *P*, bent as represented. In the free extremity of each of these levers is a hole through which a screw, *S*, projects. The size of this screw is smaller than the holes. To turn the teeth, these levers are tightened upon by advancing the screw into the loose nut, *A*. The screw is turned by a right-angle lever caught into a hole in its spherical head, while the nut is prevented from turning by a large watch-key.

By drawing the levers toward each other they lift their opposite extremities, soldered to the ferrules, causing thereby the distal corners of the teeth within them to move outward.

FIG. 12.

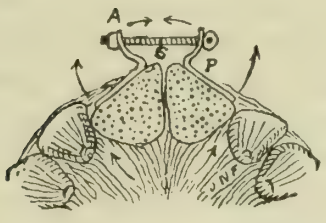
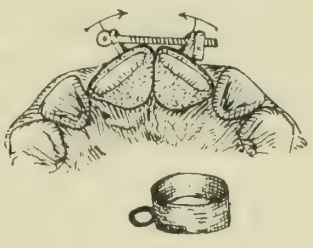


FIG. 13.



Turning upper centrals by screws.

In the second case, represented by Fig. 13, the mechanism is similar, the difference being that the screw-cut nut does not require a watch-key to hold it steady while the screw is being turned. The nut is held steady by being sufficiently large for one side of it to rest upon the ferrule. To prevent these mechanisms from irritating the lip, all the parts are made very smooth.

Another modification that works well consists of a screw, two ferrules, and two ribbons. The connection between the ferrules is made by a screw and the ribbons, one end of each being caught upon a hook soldered to the distal part of the ferrules. On the

FIG. 14.

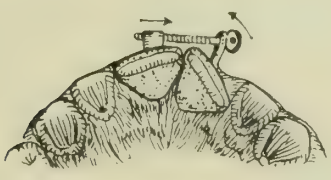
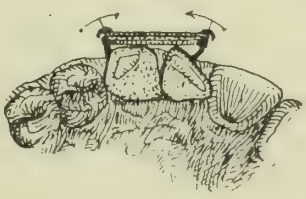


FIG. 15.



Turning one central by a screw.

other end of the ribbons (made of round gold wire, rolled thin as note-paper) are soldered nuts, one being smooth-bore, the other threaded for accommodation of the screw.

By advancing the screw through the nuts, it tightens the ribbons upon the hooks and causes the distal sides of the teeth to turn outward.

If the bearing upon the mesial corners of the incisors is not sufficient to cause the ribbons to lift upon the distal corners, a block of rubber or wood may be interposed between the screw and these corners.

I show here a case in which only one central required to be

turned. In the other cases each central served as anchorage to the other. In this one, however, requiring the turning of only one tooth (left central), only one tooth served as anchorage—the right central. (Figs. 14, 15.)

This peculiarly acting mechanism, which does its work marvelously well, is similar to the others illustrated. It consists of two broad ferrules and one screw. A threaded nut is soldered upon the labial side of the right ferrule, the one for the stationary tooth, and a long staple (constituting a lever) upon the other; the staple through which the screw projects, being considerably larger than the screw, permits of some play, and the nut, being of considerable length, prevents the screw from turning the right central. As this is a rigid anchorage, and the staple on the left central being larger than the screw, it permits such freedom of action that the draught will turn the latter tooth without turning the former.

This powerful little mechanism, which in my hands has never failed to act exactly as desired, is operated by a right-angle lever, caught into a hole in the spherical head of the screw. This mechanism (which I denominate the "Eureka Turner"), like the others illustrated, may be temporarily worn to hold steadily the corrected tooth or teeth, thus serving as a retainer. Fig. 15 represents a similar operation by elastic rubber.

Illustrative of major operations.—I wish now to draw attention to an operation that was quite interesting to me at the time I performed it. Such cases often come from families who have traveled from one end of the country to the other, seeking advice, and getting all sorts, good, bad, and indifferent, only to return home blinded in uncertainty and discouragement.

A great deal can be done with teeth if we can grasp the situation and understand what can be done and what cannot be done. The master operator sees in a flash what is possible, but the slower mind thinks the case over carefully, and both make calculations, from the first step of the proposed operation to the successful ending. The expert takes into consideration possibilities of a halt, or even retreat, in case of illness, forced journey, or breakage of machine. Besides these casts, representing this case, of a woman twenty years of age, as it appeared before and after the operation, I also show you here several figures representing the same, and illustrating the principal stages of the process of treatment. The two figures (16 and 17) represent the appearance of the two dental arches before and after the operation.

The form of the upper arch was that of a V, but did not protrude, and the teeth did not properly antagonize with the lower. Most of the left upper side teeth occluded inside the lower, while the right upper side teeth antagonized upon the lingual half of the right lower; the left upper central rode across the right lower central, while the right upper central was nearly normal. The plane of the left lower side teeth was about one-fourth of an inch higher than the plane of the right lower side teeth. The only teeth that antagonized on the left side were the first lower molar and the second upper molar, and these only slightly antagonized. The

lower jaw-bone, as the result of this abnormal antagonism, was abnormally bent, the left half being considerably higher than the opposite half; and as a consequence the left corner of the mouth was nearly half an inch higher than the right corner, and one cheek was fuller than the other. Altogether, the lower half of the face was not only twisted, but the entire face seemed distorted. Indeed, it was so deformed that the fact preyed injuriously upon her mind, causing the mental embarrassment mentioned in the earlier part of my remarks.*

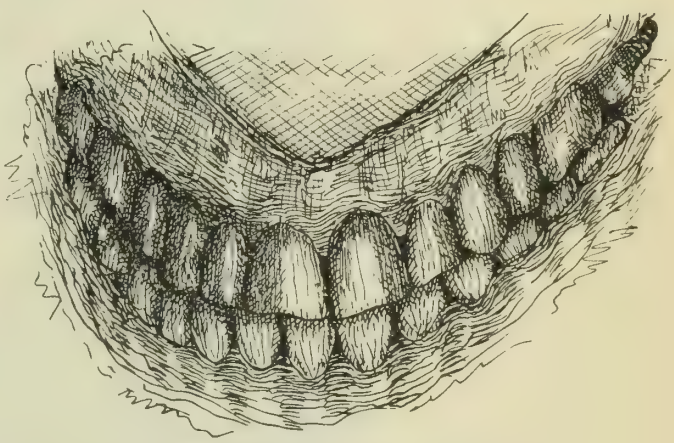
The first question naturally asked was, "Must all the teeth be extracted and artificial ones be inserted, or the teeth be saved and regulated?" A higher question, in the dentist's mind, was, "Can the teeth be so regulated as to balance and round out the face? and if not, what extent of improvement is possible?" After consideration, I told the patient that an attempt should be made to save the natural teeth, to widen the arch, and secure the best

FIG. 16.



The upper and lower arches before the operation.

FIG. 17.



The two arches after the operation.

antagonism possible under the circumstances. I also told the patient that her face could be greatly improved, but that I could not accomplish the Greek ideal of perfection. I successfully treated the case without extracting a tooth, but did some bold acts, much bolder than some of my hearers may think wise to mention here, for students to follow in their practice; but I believe I did the best for the good of the patient, and am ready at any time to defend the operation.

I shall assume that all my hearers have common sense, and explain everything. In the operation the antagonizing plane of the lower arch was greatly changed, the left side being made lower and that of the right remaining as it was originally. This lowering of the left plane was the last and most heroic part of the operation.

The risk in widening V arches by the old-fashioned plan was the liability of separating the halves of the upper maxilla. This opening of the suture along the median line also separated the central incisors. By the plan followed in this case there is no danger

*See DENTAL COSMOS for December, 1896, page 1002.

whatever of this kind. The plan was as follows: To apply two transpalatine forces: one that would bind the bones together, while the other would be at work widening the dental arch, in sections.

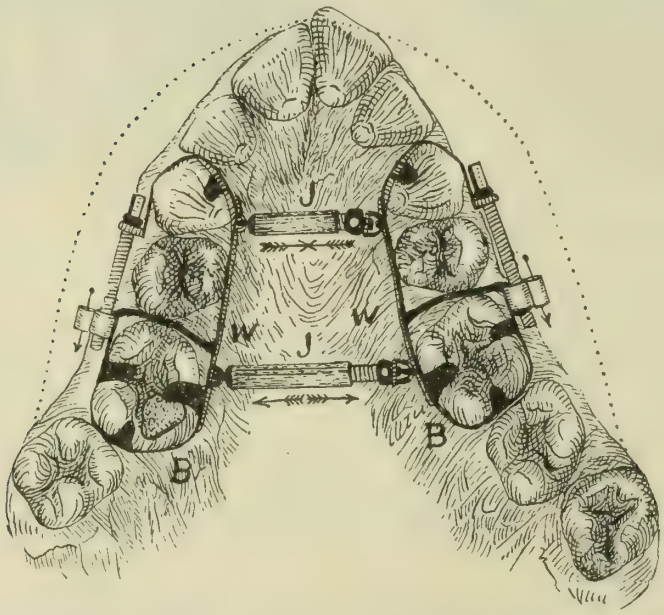
Fig. 18 represents a palatal view of the upper arch before the application of the mechanism. One bicuspid on each side was missing. The dotted line indicates the desired form of the dental arch, and the arrows the direction of the necessary movements of the teeth to give that form.

FIG. 18.



Upper arch before the operation.

FIG. 19.



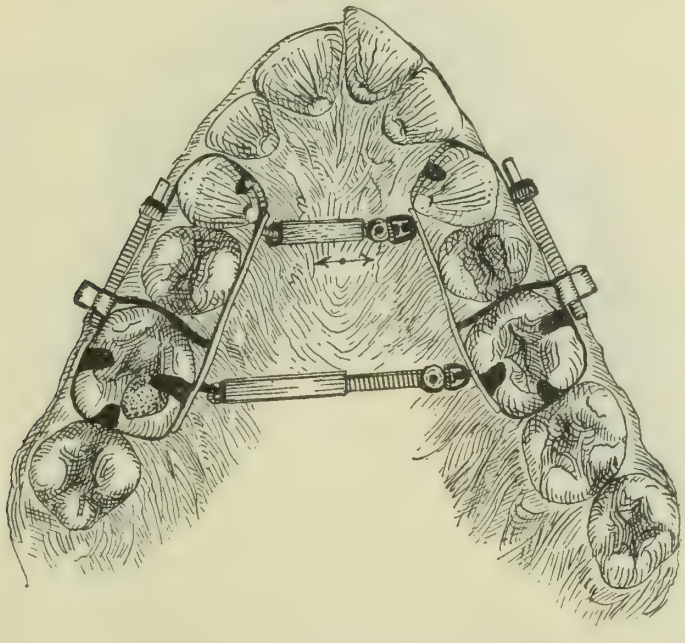
Appearance of the case when the mechanism was first applied.

Fig. 19 illustrates the same arch as it appeared with the mechanism applied and ready to begin the widening of the posterior part of the arch. This mechanism consisted of two swivel screw-jacks, *J*, *J*, in combination with two clamp-bands, *B*, *B*, as shown. Each of these anchor-bands embraced a cuspid, two bicuspids, and the first molar. To prevent the bands from working upward and injuring the gum, platinum wires, *W*, *W* (shown in black), were soldered to their opposite sides, to rest upon the teeth.

To operate the mechanism, the anterior jack was first shortened sufficiently to cause slight hugging between the cuspids, this in order to hold the two halves of the maxilla together, while the posterior jack, by being gradually lengthened, widened the posterior part of the dental arch sufficiently for it to antagonize with the lower arch.

Fig. 20 illustrates the appearance of the case at the close of this the first stage, and the beginning of the second. The teeth on each side were now nearly on a straight line, the saddle curves in the line being nearly obliterated. When the posterior jack had fulfilled its widening mission it was left there to hold its ground and to prevent the posterior part of the halves of the maxilla from separating, while the anterior jack, by being slowly lengthened, gradually widened the cuspid region of the dental arch so that it also would antagonize with the corresponding parts of the lower arch.

FIG. 20.



The case at the close of the first step of the operation

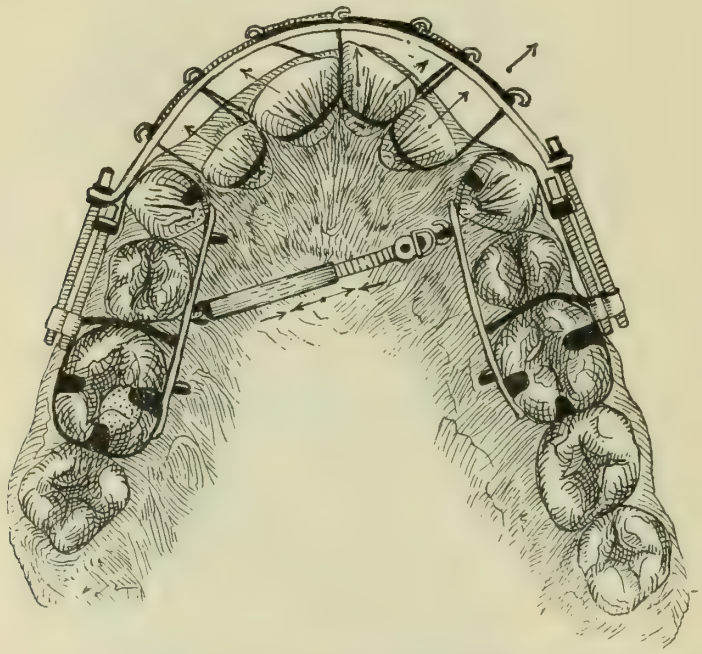
Fig. 21 illustrates the close of the second stage, and the beginning of the third stage. The anterior jack, however, had been taken away and the posterior jack replaced diagonally across the arch, as shown, to move the right bicuspid and left cuspid a little farther outward, and at the same time serve as anchors to a round wire long band, having ring-like hooks upon it for attachment of elastic rubber rings, to draw the four anterior teeth anteriorly, to round out the arch to the dotted line shown in Fig. 19.

Having placed one of these rubber rings around an instanding incisor, it was stretched in a direction that would move the tooth to its proper place; and having caught the rubber in a hook, it was stretched laterally until the proper tension was found, when it was caught upon one of the other hooks and left there to do its work. Each of the other incisors was treated similarly, as shown. These rubber rings were renewed upon alternate days until these teeth had been moved to the desired line.

The main point first sought in the process was to have the left upper side of the arch bite squarely upon the lower, but exact antagonism was reserved for later accomplishment, when the entire upper arch had been sufficiently widened and elongated and the teeth of the left side of the two jaws antagonized. But the teeth on the right side of the arches were then about one-fourth of an inch apart; in fact, a lead-pencil could easily be passed between the bicuspids and molars.

Which of two ways should be followed to bring about antagonism was pretentiously left to the patient to decide. The question was, "Shall it be accomplished through extraction of the left lower side teeth, or, destroy their pulps and grind the crowns shorter, very much shorter?" Of the two plans, either of which would be called heroic, the latter was chosen.

FIG. 21.



Appearance at the close of the second and beginning of the third stage.

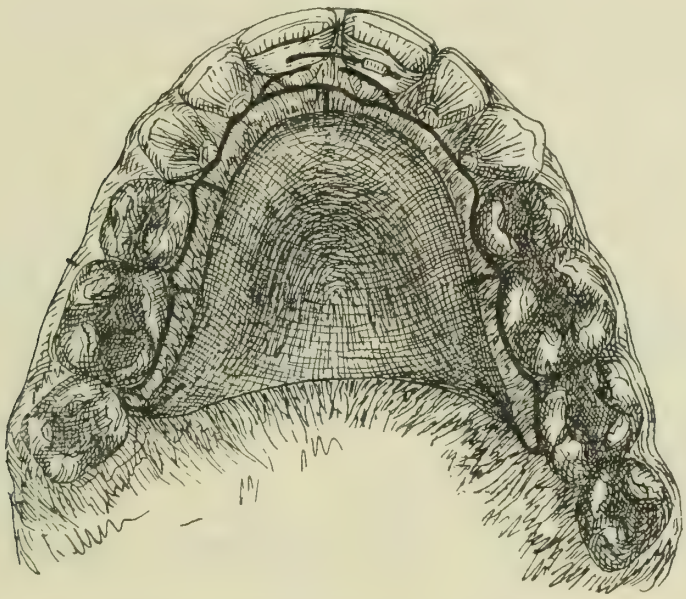
A little hole was then drilled into the top of the posterior molar, two bicuspids, the cuspid, and left lateral, and then a small quantity of arsenical paste was applied; this was kept there only sufficiently long to congest and strangulate the pulps, without the poison reaching their apical extremities. Twenty-four hours after the paste was applied the head of each pulp was removed and the chambers syringed thoroughly with warm water, after which cocain was applied and the remainder of the pulps removed. This was done without forcing any of the arsenic through the foramina. You all probably know that arsenic does not absorb below the middle of the length of the pulp. This act was done about two years ago, and no ill effects have yet resulted.

To destroy so many pulps was a bold act, and one that probably very few dentists would attempt, much less mention before a dental society. While I do not shrink from responsibilities in difficult cases, and am not afraid of being bold, I never act until I have

carefully considered all the "outs and ins" of the case before beginning any heroic operation.

To reiterate: Before taking this case I said to the patient, "The time will come when, about half-way through the operation, we shall be obliged to decide whether to extract the left lower teeth or have their crowns ground shorter." Of course, she asked the usual question, "Will it hurt?" Desiring the latter plan, I said that if it does not satisfy, resort can then be had to extraction as well as now. By the plan of extraction personal appearance would be injured, and there would be also no left lower side teeth for mastication. On the contrary, by the other plan (grinding) the teeth would be more useful than artificial teeth, and much more valuable, for personal appearance. The patient was also told that the crown part of the pulp-chambers would be filled with gold,

FIG. 22.



The completed upper arch with the Retainer applied.

and that the time might come in after-years when these teeth would need to have upon them shallow gold caps to prolong their usefulness.

After the pulps had been removed, the roots were permanently filled and the crowns of the teeth posterior to the cuspids ground to within nearly one-twelfth of an inch of the gum. The cuspid and lateral were ground only half-way to the gum.

The last stage of the regulating operation consisted in turning some of the upper incisors. After the teeth were regulated they were held in place by a scallop wire retaining plate, consisting of a hard rubber roof-plate and gold wire, formed as shown in this diagram. (See Fig. 22.) This plate, the best retaining plate yet devised, because safe, was worn about a year.

I omitted to mention that when the patient first called upon me the sockets were somewhat affected with loculosis alveolaris, requiring treatment before the regulation process could be begun. This condition of the tissues did not appear to be aggravated by the operation, but of course such an affliction is liable to recur at

any time in life. This, and a slight exposure of some of the roots, was carefully considered and explained before beginning the regulation process.

Perhaps I ought to mention that there is occasionally found a case in which the grinding of crowns of side teeth down to the gums would not permit proper antagonism of the opposing side teeth, and success could only be accomplished by extraction of some of the teeth and considerable absorption of their sockets. These cases are generally those where the posterior molars occlude so early that the front teeth do not occlude within three-eighths of an inch or more.

It might be interesting for some of my hearers to know the effect this operation had upon the mind of the patient. It had not proceeded far before she began to grow happier; indeed, she was so happy that every time she came she would say that she could "not keep away from the mirror." At first I thought personal pride accounted for all this, but later on she said that she had considerable company and desired the operation to be "hurried up," as she expected soon to have a very interesting meeting at her home. Thus it will be seen that the dentist can sometimes influence the mind if he understands how to so improve an ugly face that life will seem brighter and the world more beautiful.

Discussion.

Dr. C. G. Pease. I would like to ask Dr. Farrar what appliance he uses for moving superior central incisors together where they are separated a quarter of an inch, the teeth being parallel from the cutting-edge to the apex.

Dr. Farrar. I will represent upon this blackboard a case of that kind. (See Fig. 23.) I draw such teeth together by a clamp-

Fig. 23.



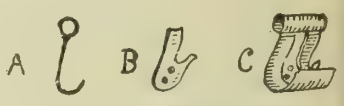
Drawing upper centrals together.

Fig. 24.



The clamp and mechanism.

Fig. 25.



The hooks.

band made of a piece of gold wire rolled thin as writing-paper, and having a threaded nut on one end and a smooth nut on the other, which are connected by a little bolt. (See Fig. 24, also Figs. 26 and 27.) This band embraces both centrals, leaving the bolt upon the labial side of the teeth. At first the fulcrums on which the teeth tilt are just above the necks; but when the crowns are drawn together, touching at the lower medial corners, the fulcrums are automatically and naturally shifted from the necks to this point of contact. To move the roots together after this, all that is necessary is to continue to tighten the same band by the bolt.

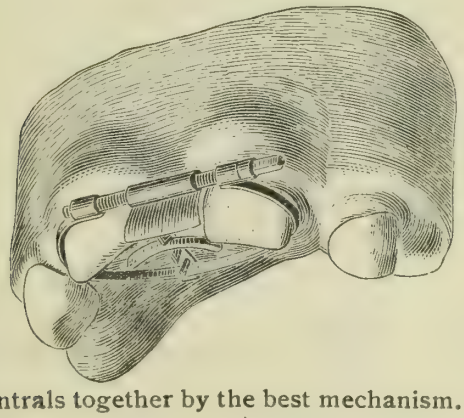
Dr. Pease. How do you keep the band upon the necks of the teeth,—*i.e.*, what prevents the bands from slipping upward, or perhaps off the teeth, and how is the food prevented from lodging?

Dr. FARRAR. The band is prevented from slipping upward by a hook suspended from the screw (see Fig. 25), and is prevented from slipping off by the form of the distal sides of the crowns of the necks, which hold the band as if in a groove. (See Fig. 23.)

Concerning cleanliness, the habits of different individuals vary greatly. Those of you who have had considerable practice know that there are many persons whose oral habits are far from cleanly. If I detect such a disposition in a new applicant, I do not often take the case; and if they wish to know why, I simply tell them that they do not take the care of their teeth that is necessary to preserve them; that if they do not properly clean them without anything upon their teeth, they certainly will not with mechanisms in their mouth. Of course they always say that they do clean them "twice a day," etc. If upon trial they satisfy me that they can and will take proper care, I sometimes take their case. This forced education not only aids me in regulating the teeth, but sometimes it establishes in the patient a habit of oral cleanliness.

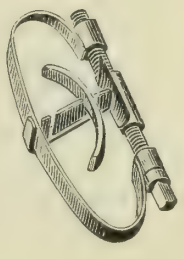
Dr. EVANS. How long did Dr. Farrar have that big case under treatment?

FIG. 26.



Drawing centrals together by the best mechanism.

FIG. 27.



The mechanism.

Dr. FARRAR. I think it was about a year, perhaps a little longer. This was one of a class of cases that regulate slowly; it was, however, a comparatively painless operation.

Dr. W. M. DAILEY. I would like to ask Dr. Farrar at what age would he regulate the teeth of a young patient. I believe he remarked that he would not regulate until the teeth were fully developed.

Dr. FARRAR. I did not intend to give that impression. I often regulate some teeth before they are fully developed. We cannot straighten a tooth that has completed its development, but we can rearrange and place teeth on an even line, whether they are fully formed or not.

When a crown of a tooth first appears through the gum there is hardly more than half a root upon it. It will be seen that because of shortness of the root it is easier to move a partially-developed tooth than it is to move a fully-developed one. (See Fig. 28.)

Dr. DAILEY. Will Dr. Farrar state at what age he would move protruding incisors into their proper places?

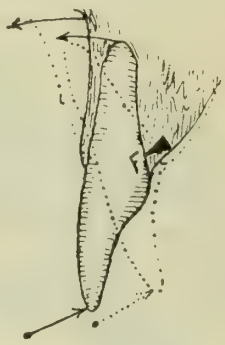
Dr. FARRAR. Concerning the effect of force upon protruding adult teeth, I have explained it in my last remarks. (See Fig. 29.) In regard to young children, they often are found with protruding central incisors at a time when the laterals are not yet in sight, or if in sight they are just appearing through the gums. The anterior part of a child's jaw grows and widens until about six years of age. This generally causes separation of the deciduous anterior teeth, and constitutes a natural prevention of crowding of the successors. As a rule, I do not advise much regulating until the anterior part of the jaw has ceased widening. I once had a young case of protruding upper deciduous teeth (all the incisors and cuspids) which only required to take nature's course of dropping them, when their successors were found erupted in the normal line. I have seen so much natural correction by growth of the anterior part of the jaw that I seldom regulate the teeth of a child earlier than ten or twelve years of age. Of course I often regulate slight irregularities at an earlier age by inclined planes, etc. To

FIG. 28.



Undeveloped root.

FIG. 29.



Effect of force upon protruding tooth.

do extensive regulating before twelve years of age often prejudices children against the dentist. When dread is once established in their minds, it is so lasting that the benefit from regulating does not do away with this bias of opinion. We should encourage our little patients to love us, not to dislike us.

Dr. MCLAREN. Will the doctor tell us the extreme age he would undertake a regulating operation?

Dr. FARRAR. Teeth can be regulated at almost any age. I once corrected the teeth of a woman fifty years of age. It was a case of moving into contact scattered front teeth. To prepare for retaining them in place, I previously told the patient that when the teeth were regulated we would hold them in their proper places by a small partial set of two artificial teeth that were necessary to fill two spaces left by two missing side teeth, all of which would greatly improve her personal appearance. I have also taken some extremely difficult cases at quite an advanced age, though not quite as old as this case. I think I mentioned some of these the last time I was before this society.*

Subject passed. B. C. NASH, *Secretary.*

*For one of these old age cases see *Ohio Dental Journal*, February and March, 1896.

Annual Convention of the Sixth, Seventh, and Eighth District Dental Societies of the State of New York.

(Concluded from page 73.)

Second Day—*Afternoon Session* (Continued).

Dr. Richard Kessell, of Buffalo, addressed the convention on the subject of "Unbreakable Vulcanite Dentures, and other Novelties of Mechanical Dentistry." He submitted for inspection an artificial set of plain teeth to illustrate his plan of festooning the gums without carving them, which is as follows: After the teeth are set up and waxed in the usual manner, a thin, tightly-wound string is first run through hot wax, then laid around the necks of the teeth, following the curve of the gums at the gingival festoons; the string is smoothed and leveled down to the height of the wax plate, and the wax polished, with the string in position, using a soft brush and chalk. The case is now ready for investment.

After it has been vulcanized, the pink, rubber-festooned gums are polished with hard brush and pumice, then with soft brush and chalk, making a beautiful looking set, both in and out of the mouth.

The set shown by Dr. Kessell received commendation from those present, and the method was thought well worthy of practice.

Dr. Kessell then showed on a large model a simple way of putting on metal backings for vulcanite work without soldering. He makes use of this plan in partial cases where patients are liable to break off the porcelain, leaving the pins in the plate. Any metal of gauge 27 or 28, either gold, platinum, or Columbian silver (he uses the latter exclusively), may be used. After the plate tooth is ground in position, a piece of the metal the width of the tooth and one-half to three-quarters of an inch in length is first annealed, then holes cut in it to accommodate the pins of the tooth. The metal is slipped over the pins, and they are bent to form an ×. The tooth, with the metal in place, is then put back on the model, which is waxed up as usual. When the case is packed the rubber will surround the bent pins and the metal. The advantage of the backing is that it gives strength to the tooth, and it also allows the lower tooth to strike only against the metal instead of the thin porcelain. Rubber will vulcanize very well with Columbian silver, and it will hardly tarnish in the mouth. This process requires but a few minutes' work, and it removes the danger of checking the tooth or discoloring it by the heat required for soldering, nor is it necessary to have the case invested.

He then spoke of the many failures in dental operations, such as the falling out of corner fillings, breaking off of enamel faces of bridges, and the breaking of artificial plates. The last he thought could be prevented to a great extent by using a material which he thinks much superior to rubber in durability, and which he uses to make what he calls the unbreakable plate, which he described as follows:

To make a durable and lasting artificial plate it is necessary to

take a perfect impression, then a bite that is absolutely correct. With these accomplished, the battle is half won. With half a success, however, he was not satisfied, and for the last three years he had been experimenting with a material which was used years ago, but for some reason abandoned. This material is the vulcanite gutta-percha prepared by Doherty, of Brooklyn. The working of the material is nearly the same as rubber, only a few points must be observed. First soften the gutta-percha in hot water; have your case heated also, then it will pack like butter. Do not cut any waste-gates, as this material requires constant pressure, and do not use spring bolts. Vulcanize about two hours at 300°, and let the case cool off slowly and thoroughly before opening it. It may be vulcanized exactly like rubber, say one hour at 320°.

There is nothing like this material for repairing rubber plates. If you use English pinless teeth, pack the gutta-percha into the holes of the teeth and finish up with rubber if you choose.

The subject was brought before the convention because the results of the use of this material had been so gratifying to him that he had never been obliged to repair a single case packed with gutta-percha, and he had been using it over three years. The doctor showed samples of vulcanized gutta-percha three-eighths of an inch thick, perfectly solid; also a plate on the model on which it was vulcanized, showing that there was no shrinkage. For a final test the doctor threw one of these plates on the floor and stood on it with his full weight without breaking it. The only disadvantage this material has, as far as the doctor could see, was that it has to be used without waste-gates, and if there is not sufficient material or there is insufficient pressure the plate becomes porous.

At the conclusion of Dr. Kessell's talk several of the older members related their experience with gutta-percha. It had been taken up to evade the payment of the license exacted by owners of the Goodyear patents from those who used rubber, but it was dropped when the patents expired. No one seemed to know just why it had been so generally abandoned.

Dr. R. Ottolengui, of New York, described several methods for regulating teeth, especially in cases of contracted arches. He illustrated his methods by a series of charts with movable parts.

The first few cases he illustrated were cases in which the split plate and jack-screws were used. In many cases these were to be commended; but in regulating the teeth no operator must be wedded to any system, but should make—and, indeed, if he would succeed he must make—of each case an individual study. The jack-screw starts with the greatest amount of force opposed by the greatest amount of resistance, and this is true of springs of any kind; but when a wooden wedge is used to furnish the force, the opposite is the result, and the force increases as the resistance lessens. His manner of using the wedge is by means of a split vulcanite plate, made as thick as could be worn, the two parts being connected in the posterior portion by a strip or hinge of soft rubber. The wedge is inserted in a cavity cut in the rubber

plates, and, of course, expands as it absorbs moisture from the mouth.

Spreading the arch is frequently lightly spoken of in dental societies without those who hear or perhaps even those who use the words knowing exactly what such a process involves. In some cases it will mean merely the movement of the teeth in the jaw, or it may mean the alteration in the shape of the jaw-bone, and again the opening of the suture in the hard palate, and thus spreading the jaws. In the latter case new bone will form to close the suture, and the jaw will be permanently widened.

Discussion.

Dr. R. H. HOFHEINZ said that the system shown by Dr. Ottolengui is the only one that in expanding the arch really expands the bones; others only move the teeth in the jaw, often causing mischievous results by altering the occlusion of the teeth. It is imperatively necessary in many cases to widen the arch by altering the shape of the bones.

He asked what was the maximum age at which such an operation could be successfully carried out.

Dr. OTTOLENGUI said not much later than twelve years; he had tried it in one patient who was eighteen years old, but had not succeeded.

Dr. W. C. BARRETT said he would not expect any practical results after the age of twelve or fourteen years; usually the sutures would be closed so that it would not be possible to open them. Now any one who has paid any attention to the development of the alveolus will know that this generally follows the tooth, and if the tooth is moved from its natural position a new deposit or growth of the alveolus will surround it in its new position. This was specially called to his attention while he was watching some of Dr. Brophy's operations for cleft palate. His operation, as is well known, is to bring the two sides of the hard palate together. In talking to Dr. Brophy of one of these cases, the prophecy was made that she would have a very contracted arch. Dr. Brophy said he supposed she would, but that even that would not be as bad as a cleft palate. Four years afterward an impression of that arch was taken, and to the surprise of all it was found to be perfect. He related other cases of similar nature to show that the alveolus would be developed where the teeth were. So in cases of spreading the arch to get more room for the teeth, under the pressure exerted there is an absorption of the alveolus on the inside of the jaw and a deposit on the outside as the teeth moved. If the force used to move a tooth is so applied as to merely swing it, the root, of course, is not moved; but when the pressure is applied as we were shown, the whole tooth is moved, and a new alveolus is formed as it moves. This accomplishes the result desired, as the occlusion of the teeth is left as it should be.

Dr. OTTOLENGUI, in closing, said that the discussion of a paper often brings out the truth more clearly than it is stated in the paper itself, and so until he heard Dr. Barrett's remarks he had not fully

grasped the whole truth in regard to the movement of the alveolus when the tooth is moved.

Third Day—*Morning Session.*

The convention was called to order at 10.30, and Dr. J. Edward Line, of Rochester, read the following paper:

The Purely Surgical in Dental Irregularities.

The reduction of irregularities of the teeth may be and usually is accomplished in one of two ways: First, by the removal of one or more of the series; or, second, by the application of mechanical agencies to force into line the tooth or teeth that have been erupted in other than the right place; or, as is often the case, third, a judicious combination of these two. The second method calls for mechanical apparatus cunningly devised, skillfully constructed, accurately adapted, and firmly fixed to that part and that much of the denture that is to serve as a base from which to operate the more or less freely movable attachments. With this method we are not now concerned, either by itself or in combination with the first. So far as the application of any one of these two methods is concerned, it is immaterial what the cause or causes that led to this or that abnormal arrangement of the teeth in the maxillæ is. The teeth may be normal to the individual, both as to size and form, but because of failure of growth and development of the facial bones, and especially the maxillaries, we find the right thing, or several of them, in the wrong place and the whole denture more or less of a misfit. Then again, the teeth may be abnormal both as to size and form, too large, or of such contour that jaws normal to the individual cannot properly accommodate them in other than a badly-disjointed arch. A glance at the proximal progenitors of this irregularly-arranged denture shows that its owner came not only honestly by both jaws and teeth, but by the former by right, while the latter were thrust upon him to do with as best he could.

Further, the jaws and teeth may be beautifully adapted to each other, but not to their owner; he may be prognathous, and this prognathism reach that degree of development inelegantly characterized as a "mug." Then the opposite may be true,—the jaws and teeth perfectly related as to size and form each to the other, and yet so small that when compared with the upper part of the face the subject at first sight suggests a hydrocephalic. So while the growth and development of the jaws on the one hand and the size and form of the teeth on the other may, when considered separately, be all that could be desired, their relation to each other may be such as to call for operative interference, either in the interests of a better adaptation of the one to the other, or both to their facial setting; a forcing of interdependent structures from a perfectly natural into an approximately normal relation. As already suggested, this may be effected in one of two ways, or a sort of compromise between these two. The first may be spoken of as the purely surgical, finding its simplest expression in the extraction of one or more members of the series. The tooth

removed may be in itself the sole offender, or it may be sacrificed to accommodate another whose obtrusiveness is its only offence. In either case, the tooth extracted is very nearly full grown, and except in rare instances it is in full sight. More than that, its removal is to correct an irregularity that is now on, seen, appreciated by the operator and also by the patient personally, if of years of understanding; otherwise by those in the exercise of guardianship. This is not always clear sailing, but as a rule the skilled operator knows, as he should, what he is about. But how is it in an irregularity that is not apparent,—one that is in prospect yet to come? Should he anticipate an irregularity that is a little short of the inevitable, or should he wait, as is our habit, until the senses have full cognizance of it, and when the best results may not be attainable?

In considering these questions it must become a foregone conclusion with the operator that an irregular denture is inevitable unless anticipated by surgical interference. This conclusion cannot fully become "foregone" until the first permanent molars have been erupted, or, better still, the first permanent molars and central and lateral incisors. It is between the molar and lateral that the work must be done, for of all the teeth in the jaws the cuspids and bicuspids seem to have the greatest difficulty in finding room; or if this statement is too sweeping, the cuspid and first bicuspid; or if this, then the cuspid alone.

As pointed out years ago by Dr. Louis Jack, and probably hinted at by others before and since, the deciduous cuspid is of all teeth most apt to be crowded from its place in the denture,—not, however, by its own successor, but rather by the adjacent bicuspid and lateral. The draft of the back teeth forward and the movement backward, however slight, of the incisors secures the arch already in it as against the cuspids yet to come. Whether this be charged to a check in the growth of the jaw or failure of development of the alveolar border, or both, the fact of the insufficient room remains. To make this much-needed room for the cuspids, to give them their rightful place in the arch as essentials of expression, is a problem easy of accomplishment if a young patient is made the contributor of his part to that end, and the operator has the "nerve" to suggest and the small skill necessary to bring about its solution. In 1878, Dr. Jack read before the Alumni Association of the Pennsylvania College, and published in the Dental Cosmos of June of the same year, a paper on "Treatment to Correct the Consequences of Premature Loss of the Deciduous Cuspid," in the course of which he suggested first the extraction of the deciduous first molar, then the opening of the crypt and removal of the first bicuspid, or so much of it as had developed. The apparent certainty of satisfactory results and the novelty of the operation made us anxious to indulge in it at least once; but notwithstanding the multitude of cases, it was not performed until 1891. The subject was nine and one-half years of age, undersized generally, and especially so as to the superior maxillæ. A careful study of the case led to the conclusion that surgical interference

would be called for sooner or later, and that better results would be obtained if indulged in early. We decided at first to operate on both jaws, but later modified this so as to exclude the lower. This, by the way, we have since thought the part of wisdom, in which we have been reassured by again reading the paper in question by Dr. Jack. There should be no postponement in the case of the upper jaw, but there may be in the case of the lower. Acting on this judgment, the patient was etherized and the first deciduous molars extracted. The bone hiding the developing bicuspids was

FIG. 1.

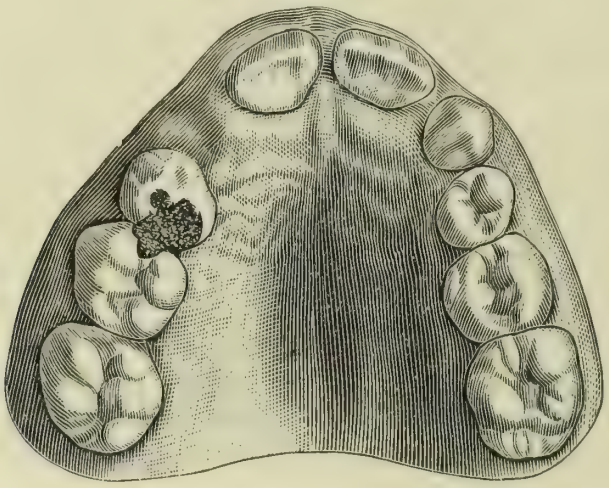


FIG. 2.

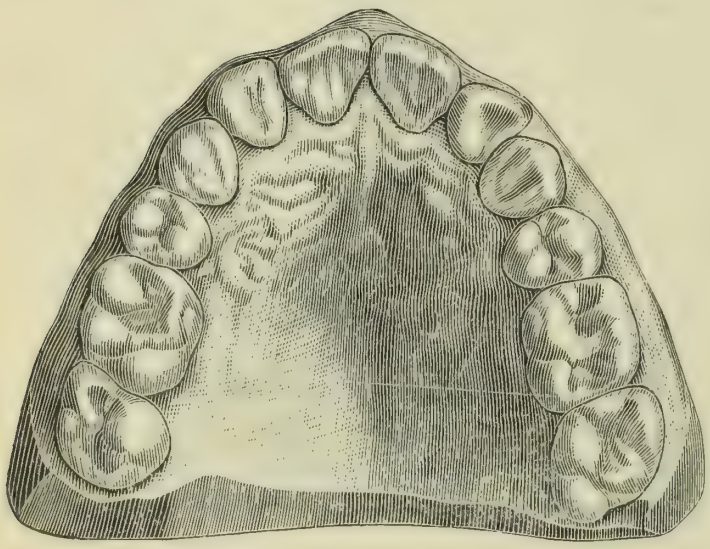
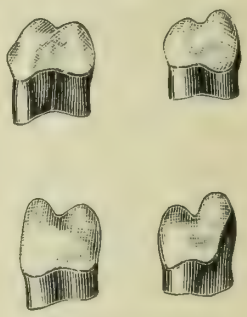


FIG 3



Teeth removed.

cut out by means of a fissure-bur operated by an engine, and the teeth themselves were scooped or spooned out by means of an elevator, and this was done without encroaching in the least on the outer alveolar plate.

Dr. Jack rather favors the removal of the process covering the roots of the molar, sacrificing, if necessary, the tissue adjacent to the developing permanent tooth. There is little or no objection to this, inasmuch as the sole function of the alveolar process is the support of the teeth, its building up or taking down being wholly dependent upon the presence or absence, respectively, of the dental

organs. The case before us must, I think, be conceded a success. The one suggestion I would make in this purely surgical operation is that it be performed as early as the operator can convince himself of its necessity or desirability, and for two reasons,—the greater ease of its accomplishment and the greater certainty of a perfect result.

In conclusion, I show first a model of the jaw at nine and one-half years (Fig. 1); second, a model of the jaw of to-day (fifteen years) (Fig. 2); third, the deciduous first molars; fourth, the succedaneous bicuspids, with their fully-developed crowns and partially-formed roots (one-sixteenth inch), both containing their pulps and one carrying with it the lining of the crypt itself (Fig. 3); and, fifth, the patient himself.

Discussion.

Dr. R. Ottolengui spoke of the difficulty of retracting the lower jaw. In the text-books a method is described of exerting pressure through a chin-piece for this purpose, but he thought it would not be possible to affect the shape of the bones by such means, as the pressure on the chin would be unbearably painful after a short time. In one case that came to him for treatment, the jaw was bent in such a way that it was impossible to bring the anterior teeth together. An effort had been made to force the jaw up by pressure, but the pain was too great, and Dr. Ottolengui had suggested a method that had not yet been tried. The intention is to remove the second bicuspid on each side and saw out a triangular section of the jaw-bone, including the sockets of these teeth, then make a splint to retain the parts in their proper position till the bone unites. He had assisted in a similar operation for cancer where the jaw-bone was sawed quite in two. An original splint was made from metal dies of both jaws, with a complete cap for the teeth; the splint was cut away to expose all of the six front teeth. After the splint was made ready, the operation was performed and the jaw divided. It then was placed in position, with the splint holding it firmly to its place. The patient was fed for three weeks through a tube, when the bone was found to be united, the parts all healed up, and perfect occlusion of the teeth secured. Soon after this operation the patient with the deformed jaw spoken of came along, and though the operation was thought to be perfectly feasible, the patient would not as yet consent. The operation would be to make a model of the lower jaw as it should be, and to make the splint from the model, then cut the jaw and put it in the splint.

Dr. F. A. Greene, of Geneva, thought it not well to attempt to correct irregularities too early in life, and spoke of a case of a young man who came to him for advice and treatment. His upper jaw was very much contracted and the teeth overcrowded. His mother's jaw had been in much the same condition when she was young, but had in a good measure corrected itself as she grew to full age. Supposing that the son's condition would improve with time as his mother's had, Dr. Greene advised him to wait; but

he went to another dentist, who extracted a bicuspid on each side, assuring him that with these out the trouble would be fully corrected. The consequence is, however, that the occlusion of the teeth is so bad that only three teeth in the upper jaw touch the lower teeth.

Dr. R. H. Hofheinz, of Rochester, said it was impossible to lay down a rule as to the age at which an operation should be performed. Some operate as early as the irregularity is seen, and then operate again if another irregularity occurs. To show how much trouble an operation undertaken too early will cause, he spoke of a case in which the first permanent molars had been extracted on account of an overcrowded arch. This was done before the patient came under his care, and he had had endless trouble to retain the other teeth in their proper places. He thought that unless a man has proper knowledge of the physical principles which govern the growth and stability of the teeth, he should never undertake a case of regulation.

Dr. Greene believed in conservatism in the treatment of irregularities. In many cases, when a patient asks what can be done for such a case the dentist makes an examination and gives his opinion at once. This should not be done, but a cast of the mouth should be taken and models made and carefully studied. Measurements of all the teeth should be carefully made to ascertain whether they are adapted to the arch. If the combined measurements of the teeth are found to be too great for the arch, then you must advise extraction of one or two teeth. It will be much more to your advantage to form and express an opinion only after careful study, for if you have to change your opinion after it is expressed you will lose the confidence of the patient.

Dr. Line said the effort to alter the shape of the lower jaw by the application of pressure upon the chin is based upon the theory of absorption produced by pressure. The aim would be to produce the absorption in the condyle, but it would naturally take place in the chin also, and this would probably cause a deformity of the face.

Dr. Ottolengui emphasized the fact that in regulating cases it is often necessary to extract teeth, but said that a man who extracted one or more teeth and left the rest to regulate themselves was guilty of malpractice. When a tooth is extracted the socket is empty, and less pressure upon the tooth which should go into that space will be required than would be after the socket has been filled up by a deposit of bony matter. What Dr. Line says of interstitial change and absorption is true, or would be with a block of wood; but perhaps it would not apply to the jaw, as the texture is not like wood—homogeneous, with fibers running through the mass in the same direction. A section through the jaw shows three classes of tissue in the bone,—first a cancellous tissue, next a more dense tissue, and on the outside a hard, dense crust that will not be condensed. Outside of this is a cushion of membrane and muscles which will crush and inflame long before the pressure will change the shape or the density of the bone beneath.

Discussion ended, and Dr. A. Osgood, of Bath, read the following paper:

The Use of the Corundum Wheel in the Preparation of Cavities.

For several years past it has been my habit to make much use of the corundum wheel in the preparation of cavities for filling the teeth. I will first speak of cavities on the coronal surface of the bicuspids and molars. Very frequently the wheel is the first thing I use in leveling down the surface about the orifice of the cavity; then use the chisels and burs and excavators until all decay is removed and cavity properly shaped, when it will often be found necessary to again use the wheel to smooth down uneven margins. When this is done you can introduce a filling that has a well-defined outline, and particles of food will not be retained in the depressions which usually surround the filling. The posterior depression of the superior second molar is frequently found quite deep; and if there is any show of decay, there should be a sufficient cutting down to permit the food to glide off, or we are very likely to find occasion to refill the tooth in a much shorter time than is necessary. They are teeth that are much neglected by the brush and are prone to decay. It is good practice to anticipate decay in the locality mentioned, and make free use of the wheel there to lessen the danger to which they are subject.

The third molars very frequently require an entire change of the coronal surface, and the wheel should play an important part if they are decayed. We often find the biting surface a mass of small cones and fissures, which the wheel will greatly improve, and should be used until no lodgment for food is retained, whether they are decayed or not. They are hardly ever reached by the brush, and should be brought to a self-cleaning condition as nearly as possible. If this work of leveling down the enamel on the crown surfaces of the bicuspids and molars—I mean the marginal portion surrounding the prepared cavity—is thoroughly done, when you see the effect in after-years you will feel repaid for the time expended in the operation.

In preparing cavities of the incisors and cuspids I rarely use the wheels or disks, but for approximal cavities in the bicuspids and molars they are occasionally useful in separating the teeth. Usually separations are better made with either straight or bent chisels that are thin and of proper form, but if a disk is used it should be thin, and with a fine grit to do it neatly and with consideration for the feelings of the patient.

In large, compound approximal cavities we frequently have a sharp, weak corner which should be removed. It may be objected that by so doing the masticating surface is lessened; but that is not of so much importance as the strengthening of the tooth by giving it a greater power of resistance. It is much better to grind off all weak corners than to leave them to be broken down sooner or later. It also has the effect to reduce the size of the

cavity, which is an advantage. This practice should obtain in all cases where the teeth are of a feeble structure.

My success has been the best with this class of teeth where I have heroically used the wheel and given the teeth strength by reducing their weak points. The making of wide spaces between the teeth should be avoided, and where possible the filling should be carefully contoured sufficiently to bridge over any opening that is made; but it is better to leave a space than very frail walls.

If this work is attempted with large wheels or disks of coarse grit, such as the dealers usually furnish us, it will not be properly done, besides being an exceedingly trying operation to most persons that come into our hands. We should remember that a coarse corundum or carborundum wheel is a terror to every one who has the usual amount of nerves, and they have the feeling that you are doing your work in a cruel manner, which adds much to their dread of the dental engine. I find very few disks or wheels that are offered by dealers that are satisfactory, and for some time I have made those I use, specimens of which I pass around. They are made by the Taggart corundum point and disk maker, but I had some additional molds made by a machinist to add to the variety. This very valuable invention has, I believe, been withdrawn from the market, which is unfortunate, for with it we could always have a supply of the small points that can be used to so good advantage.

Discussion.

Dr. W. W. Belcher said that the small corundum wheel was much superior to a fissure-bur for cleaning out fissures to prevent the occurrence of decay in molars.

Dr. Percy D. Greene said there was much importance in getting the teeth in a condition that they would be kept clean. Dentists usually remove green-stain by means of a wheel and pumice-stone, and the green-stain almost invariably returns. If the surface, however, is left perfectly smooth it will not return. Cases of white spots of decay on front teeth treated by burnishing such spots with a steel burnisher moistened with pyrozone will prevent recurrence of the decay and save the teeth.

Dr. R. H. Hofheinz thought there was no operation in dentistry more mischievous than the grinding of teeth, unless it is done with careful judgment. It is good practice in approximal surfaces, but should not be done in a sulcus, and in a fissure you would have to go to a depth which would be quite objectionable.

The subject was passed, and the convention adjourned to meet next year at Buffalo.

Ohio State Dental Society.

The Ohio State Dental Society held its thirtieth annual session at the Neil House, Columbus, Ohio, December 1, 2, and 3, 1896, Dr. Henry Barnes, of Cleveland, presiding.

First Day.

The morning session was taken up entirely with executive and routine business.

The afternoon session was called to order at 2.30. The address of the president was chiefly upon the necessity of a united effort for the increase of membership in the society, claiming that the number of dentists in the state should give the state society a membership of several hundred, thus increasing its usefulness and power for good, besides benefiting a larger number by the excellent papers which were usually read at its meetings.

Dr. J. R. Callahan, chairman of the Executive Committee, said it had been the special desire of his committee and their earnest effort to interest the dentists throughout the state in the society, and he presented the program of the meeting, with a number of new names of those who were to read papers, as a measure of his success. He suggested that it would be an improvement to elect the officers for the coming year earlier in the session. This would enable the president to name his committees, and let them do something toward arranging the program for the next meeting, while the members were together and within his reach. This suggestion had been presented to the Board of Directors and had been acted upon favorably by them, and the election was ordered for the evening session of the first day of the meeting.

Dr. H. A. Smith, of Cincinnati, said that in his view any member who had any views or theories calculated to advance the knowledge of dentistry or improve the practice should feel it a duty to present them to his state society, and thus make the meetings more valuable. All reputable dentists should be members of the state society, and this organization should have at least from three hundred to five hundred members. A few years ago, Professor Watt or Professor Taft, or both of them, inaugurated a system of district societies in this state calculated to act as feeders to the state society, but these have gone out of existence; there seemed to be no place for them.

The discussion on the president's address was closed, and Dr. W. I. Jones, of Nelsonville, read the following paper:

Teeth Extracted without Pain.

If the statements of the people are credible, there is not another operation in surgery besides the extraction of a tooth which they so much fear. The surgeon's table is not approached with a greater apprehension than is the dentist's chair, and this fear is real. The wonderful tales which are told about this operation are not altogether legendary. The pain is the genuine old "blown-in-the-bottle" kind, and none other is reliable; and the dentist who in these latter days depends for his success upon his sweetness of manners and the assurances that "it is only a trifle" and "will be over in a second," must be content to listen to the fearful shrieks and groans that are sure to accompany the old heroic method of the extraction of a tooth.

Now, it is not the purpose of this paper to discuss the indications which point to this operation, but to consider ways by which a tooth may be extracted successfully and satisfactorily without pain. This is a duty the dentist owes to human happiness. It should no longer be possible for us to locate a dental office by sound.

Chloroform, ether, nitrous oxid, have been in use many years, and with them teeth may be extracted without pain; their good points are many, but are outnumbered by those of any local anesthetic which will produce even a partial anesthesia of the organs to be operated upon. The extraction of a tooth during a state of general anesthesia requires special qualifications on the part of the dentist. He must be skillful, and possess a steady nerve and a clear head. This is especially true of nitrous oxid, owing to the transitory effect of the agent. Many operators, when lancing is necessary, lance the gums before administering the gas, and continue their operations after the patient begins to recover. The very purpose for which the anesthetic was given seems to be forgotten in their anxiety to get out the teeth. They save but little pain. Such an operation is not a successful one, and certainly cannot be very satisfactory to the patient. If you are going to administer gas, give until your patient becomes unconscious, and cease operations when he begins to recover. Chloroform and ether are sometimes administered until the patient has reached a state of semi-consciousness, or hardly that far,—a condition some surgeons describe as "ether glow." To be successful by this method, the patient must be given to clearly understand that he will have a knowledge of what is going on about him, but that he will suffer no pain.

Of the local anesthetics, cocain is at once the most powerful and reliable, and none bears a greater burden of calumny; but in the hands of the careful practitioner it will prove effective and satisfactory.

The following is a formula we use and pronounce good:

Cocain, gr. x;
Listerine, ℥ ss;
Aquæ destillat., ℥ ij.

This makes a little less than one and a half per cent. solution. In fifteen minims of this solution, which will be found sufficient for the extraction of a tooth, there is but a fraction over a fifth of a grain; this amount is, with rare exceptions, non-toxic. We have used cocain for over seven years, and in the last two years we have injected it hypodermatically into more than two thousand persons, have used it in numerous combinations, various percentages, and upon "all sorts and conditions of men." We have had some peculiar experiences, all of them interesting and instructive. Very rarely will a careful use of cocain cause any untoward result; ordinarily it is quickly eliminated. Sometimes it will stimulate, and a sense of well-being is produced; at other times the injection is followed by a feeling of oppression, which may be quickly relieved by the inhalation of ammonia or ether. After an overdose the pulse

becomes weak and rapid, breathing is labored and shallow, a cold perspiration breaks out, and the skin is clammy. These symptoms are at times accompanied by clonic convulsions. In a case of this kind nothing should be done that will excite the patient. He should be placed in a recumbent position, and stimulants administered. Aromatic spirit of ammonia is one of the most reliable cardiac stimulants, given by the mouth in fifteen to twenty minim doses, diluted in water or injected hypodermically; inhaled, it stimulates the trifacial nerve and increases blood-tension by reflex action upon the vaso-motor center, and prevents syncope. To relieve the nervous symptoms, one-eighth grain doses of morphin may be given by the mouth. If the patient is unable to swallow, inject hypodermically.

Great care should at all times be used in the administration of an anesthetic, no less so with a local anesthetic than with one of general effect. We have given cocain when the patient was known to be affected with valvular disease of the heart, believing the heroic method for the extraction of a tooth in a case of this kind more liable to do harm than would cocain, and we have administered large doses to persons upon whom at first minute doses have had apparently toxic effects; the eyes would become dull, countenance pale, skin clammy, which was quickly relieved by stimulants, more cocain given, and as the operation proceeded the patient grew stronger. Idiosyncrasy, no doubt, is the only explanation for many peculiar cases. By the injection of pure water I have caused what was apparently cocain poisoning. If cocain had been used, it would have been condemned for what was only a manifestation of the peculiar temperament of the patient.

Eighteen months ago William R. came to our office to have a tooth extracted. Cocain was injected, and almost immediately we found it necessary to administer stimulants. A year later he returned to have another extracted, and requested that "that stuff" should not be used, thinking that it had made him sick the last time. We complied, and turned to get an instrument. This opened the show, and there followed every indication of cocain poisoning.

If a hysterical woman should come to your office accompanied by a henpecked husband, and you should have a scene, do not be in a hurry to attribute it to cocain. In every case study the temperament of your patient, and act accordingly.

Discussion.

Dr. W. H. Todd, of Columbus, said that at the Tri-State Meeting held in Detroit last year there was an interesting paper on the subject of local anesthetics read by Dr. Haupt, who recommended the use of tablets prepared by Parke & Davis. The bottle in which the tablets are sold is a convenient measure for making the solution, one tablet in the bottle half full of water making a two per cent. solution. The use of these tablets gives a solution always fresh and safe.

Dr. O. N. Heise used Schleich's method, using two grains to an ounce of water. He did not think, however, that the cocain produced the anesthesia so much as the edema caused by the entrance of the solution into the tissues. He had lately used eucain in ten per cent. solution, injecting about five drops. This seems absolutely safe, even with twice this amount. The effect is also more lasting than that of cocain. In cases of pyorrhea he prefers the Schleich solution, as it is never followed by sloughing.

Dr. Otto Arnold used eucain, and preferred it to cocain, as it appears to be free from all toxic effects; but where teeth that are firmly imbedded are to be extracted, in his opinion there is nothing better than nitrous oxid when it is carefully handled. He believes that statistics would show that there had been more fatalities from cocain than there had been from nitrous oxid, though the latter had been in use so much more generally and so many years.

Dr. W. D. Snyder was especially pleased with this paper, as it is right in the line of every man's practice. In his practice he never extracts a tooth except where it is absolutely necessary. He does not like to cause pain, nor does he like to use a local anesthetic to avoid it. The action of local anesthetics is always more or less uncertain; sometimes the desired effect does not follow an injection. When he sees the tissues grow white he feels sure that the effect will be good. The preparation which he uses is five grains of cocain, one-tenth grain of atropia, ten drops of carbolic acid, and one ounce of water. This he usually finds satisfactory.

Dr. L. E. Custer thought that the idiosyncrasy of patients under cocain might be accounted for by the possibility that the injection, instead of entering the arterial circulation, might enter the venous circulation and thus be carried to the heart and lungs. This may account for the peculiar and erratic action of the drug.

Dr. G. H. Wilson said the thought just suggested by Dr. Custer was interesting. Once in his early experience with cocain he used it for the extraction of a lower third molar. He realized very quickly that the drug had entered a blood-vessel, and by the time the patient had been unconscious for half an hour he began to feel that perhaps it might be dangerous. The cataphoretic use of the drug may probably furnish the safe method of use.

Dr. W. H. Todd had used cocain cataphoretically for extracting teeth. It was a very successful and a pleasant way to administer it. The application is made to the gum, using a two per cent. solution, with from five to ten volts of current, according to what the patient could stand.

Dr. L. L. Barber had better success with eucain than with cocain, and never had any alarming symptoms from its use. He thought that the amount of cocain that entered the system with the cataphoric administration was so small that no evil could follow its use. He had not used very strong solutions himself, but had heard of others using as high as seventy-five per cent. with no bad effect.

Dr. C. R. Butler could not see the consistency of using such substances as cocain or eucain, or the preparations of these with

carbolic acid. We know that there are persons to whom even a small per cent. of any of these drugs is poisonous. In the use of these vile poisons, what is the effect upon the system? They must be got rid of at some expense. We are not warranted in using these things when there is no necessity. This has been called the age of anesthesia; but these many preparations are not used so much because the people want them, as because some dentist wishes to show what wonderful things he can do. Now, simply because we have a patient with a headache, are we justified in injecting morphia, knowing we may get after-effects more troublesome than the headache?

Ether and chloroform, if used carefully, are safer than these injections; nitrous oxid is better still. This paper should set us to thinking. The author does not say these preparations are better than gas or ether, and it is well that he does not. We cannot say they have no toxic effect, for the harm may show a considerable time after the operation.

Dr. C. M. WRIGHT quoted a recent medical journal as saying, "There is no such thing as a purely local disease." He believed this is true, and thought that when we apply a local anesthetic it may have other than purely local effect. Is it not impossible to apply a poison to one part of the body without its having a general effect?

Dr. A. O. ROSS said certain rules are taught as to the methods of making injections; among others, we are taught to avoid bony prominences and large veins. In making injections in the gums we get as near a bony prominence as possible, and he believed the sloughing and exfoliations that follow such injections are a consequence of getting the point of the syringe under the periosteum.

Dr. SNYDER did not intend to convey the idea that he was a crank on the subject of local anesthesia, though he practiced it. It is probable that bad results arising from the use of the hypodermic syringe often arise from lack of care of the hypodermic needle. If there is carelessness, the result will be that microbes will be conveyed into the wound made and cause trouble. The needle should be thoroughly disinfected always before use, and care should be taken to avoid the periosteum. The surface of the gums also should be clean before the injection is made.

Dr. H. A. SMITH said Dr. Snyder has made a good point. No doubt, trouble is often caused by the lack of surgical preparation of the part before operation, thus carrying pathogenic germs into the gums. We can remove the danger by sterilizing the tissue first. Dr. Custer's remark should set us to thinking. If we inject into the veins we endanger the patient.

Dr. JONES, in closing the discussion, was glad the discussion had taken so wide a range and so many points had been touched upon. When it is necessary to extract teeth, we should use some means to avoid pain. It is a duty we owe to the human family. In making an injection he did not make it close to the teeth, but in the deep tissues, where it is easy to get. Cocain acts upon the ends of the nerves of sensation.

The subject was passed, and Dr. H. J. Custer, of Johnstown, Ohio, read the following paper:

Dental Operations during Pregnancy.

Several years ago a young married lady of lymphatic temperament presented herself in order to have a superior lateral incisor filled with gold. Nothing was said regarding her condition, but circumstances indicated the first weeks of pregnancy, and a cement filling was accordingly advised.

The patient insisted upon a gold filling, which was finally agreed upon. The cutting of the sensitive dentin apparently caused but little pain; in fact, the several steps of the operation were accomplished with but little discomfort until a finishing strip was introduced, when the first and only rasp caused a momentary muscular paroxysm. After a few moments' interval the filling was completed by the aid of disks, and the lady left the office without much depression and well satisfied with the operation. However, the second day after the operation uterine contractions were established, and after several days of rather serious illness an abortion of about the tenth week was completed; while the visit was postponed and the topic of this paper sufficiently stamped upon the mind of the reader to culminate in the present article.

That very serious results do sometimes follow dental operations during the period of gestation is evidenced by the best authorities and by detailed reports of such occurrences. But, after investigating the literature upon the subject, it appears that the dangers of this period are not generally comprehended, for nearly all the reported cases show abortion to have occurred very soon after dental irritation; and, secondly, a number of practitioners testify that they have practiced many years and never knew any trouble to follow; which, while the dentist is perfectly conscientious, would seem to imply that an abortion must follow soon after operation, while the following would seem to indicate that detrimental influences to the fetus or an abortion may follow weeks or even months later as a result of irritation, and the dentist lose sight of the case.

In the first place, reliable gynecologists conservatively say that at least seventy per cent. of all adult females are afflicted with some disease or diseases of one or more of the generative organs; consequently there is a very prevalent predisposition to abortion.

Further investigation shows that nervous reflexes dependent upon diseases of the generative organs frequently aggravate and may cause insanity. Conversely, eminent psychologists testify that nervous and mental diseases often seriously interfere with the functions of the reproductive system, while amenorrhea and premature expulsion of the uterine contents as a result of prolonged anxiety, fright, pain, grief, or strong mental emotion are not uncommonly reported, and there are many abortions other than criminal, whose occurrence is shielded from public notoriety.

Hegel records "one abortion for every eight or ten full-term deliveries." Women who have a diseased uterus, ovaries, tubes, or a pelvic cellulitis complain of neuralgic pains, which frequently

find expression in the trigeminus. Gestation is often accompanied by toothache, while the pains of parturition have been known to alternate with pain in the teeth.

Pregnancy, which primarily is a physiological condition, on account of the prevalence of pelvic disease often assumes more or less of a pathological nature, and during disease the reflexes are especially liable to be perverted and irregular.

From the foregoing clinical observation it would appear that the reproductive organs maintain such intimate communication with other regions, and are so susceptible to reflexes, that it is necessary to press the button but lightly in the region of the trigeminus and precipitate a calamity of no inconsiderable proportions.

Having briefly considered the possible tendencies of dental irritation, let us now inquire into their relation to the causes of abortion.

According to Lusk, the underlying causes of abortion, miscarriage, and premature delivery are the same. Causes of abortion are rarely of sudden occurrence. Usually the way is prepared either by changes occurring in the ovum or by certain pathological conditions affecting the mother. In either of these ways a disposition to abortion is produced. When once, as a result of morbid changes, the attachment of the ovum to the uterus has been rendered insecure, causes usually inoperative suffice to determine uterine contractions and the time at which the expulsion occurs.

The disposition to abortion may be due primarily to any disease of the chorion, such as syphilitic degeneration of the villi. In most cases, however, death of the fetus precedes and leads to disease of the chorion. Therefore, the causes of abortion are in large measure causes which produce death of the fetus, which, having occurred, is followed by expulsion of the ovum, not usually at once, but after a longer or shorter period of time.

There is also a class of women in whom there is neither disease of the ovum nor of the genital organs, and yet pregnancy is interrupted, according to present information, from certain personal conditions of nerve irritability. Psychical and physical excitement which would be of small moment in some women in them suffice to empty the uterus.

Recalling the percentage of women with uterine trouble, and consequently a more or less predisposition to abort, the exciting causes should now specially interest us. There is, first, hyperemia of the gravid uterus. When predisposing causes have weakened the attachment of the ovum to the decidua, anything which determines the blood-currents to the uterus is liable to produce extravasations of blood around the ovum and awaken uterine contractions, the contents usually being expelled at an early date; or the hemorrhage may be intra-placental, or into the serotina, or into the uterine sinuses. The extravasated blood usually undergoes the ordinary metamorphoses, and the pressure upon the villi produced by the extravasations impairs the nutrition of the fetus and may cause its death, in which instance the expulsion might occur weeks after the exciting cause has operated.

As a second exciting cause, there may be uterine contraction produced by influences which act directly through the nerves, such as are produced by powerful mental emotions. The results of this process are usually soon apparent.

However, the contractions may not be sufficient to cause a final result at once. The ovum may change position within the uterus and the abortion be incomplete; or, again, the blood extravasated around the ovum or into the tissues may not bring the case to a final issue for weeks, or even months.

Circulatory disturbances and muscular contractions, with the possibility of detrimental trophic changes, are then conditions to be especially avoided during pregnancy. As dentists we may unintentionally and indeed unavoidably produce the two former and perhaps the latter conditions as a result of shock. The reflexes of either physical or mental shock may stimulate the uterus to contraction, and probably this cause is responsible for most cases of immediate abortion or those for which we may be held responsible.

Investigating the pathology of shock, we find that one condition, though not a constant one, is an engorgement of the abdominal veins from vaso-motor paralysis. As before shown, this condition is very dangerous to the gravid uterus, and the ultimate results may occur early or be obscured by the future.

Shock, as most often seen by the dentist, is of the immediate variety, and frequently observed before the patient leaves the chair.

But there is another variety, an insidious form of shock, in which the symptoms appear rather late and are out of all proportion to the gravity of the injury.

The patient may leave the office apparently calm and unaffected; may have a good color, quiet pulse and respiration, and nothing appear wrong. But a little later insomnia develops; the pulse becomes soft, quick, and rapid; there may be chills followed by fever, and the depression may last for days and weeks, perhaps only to terminate in some nervous disorder.

Several times during hospital experience I have witnessed this form of shock, and have had the opportunity of observing every detail of two such cases occurring in my own practice. Fortunately, both cases were only moderately severe, and occurred in young unmarried ladies. These cases of latent shock or depression sometimes occur unknown to the dentist, and cannot prove other than very injurious during gestation. Besides the liability to circulatory changes and uterine contractions, since the nervous irritability is long continued, there is no evidence contradicting a trophic disturbance, especially in a process so entirely dependent upon nutrition; while present but meager information would rather confirm the theory.

We may also add that the accompanying fever can in no way contribute to the welfare of either mother or child.

There now remain for consideration the several reflexes unassociated with shock. When the trigeminus is irritated, even in health, there is no telling whether or not any decided reflex will be

instituted, or, if any, whether it will be secretory, muscular, vaso-motor, or possibly trophic; or perhaps all the reflexes may operate more or less at the same time. Of these reflexes, that of muscular contraction is much to be feared, the results being the same as uterine contraction from shock.

And it is well worth remembering that nerve-centers have the power of augmentation of reflexes, and that reflex muscular contractions are more sustained than those produced by direct stimulus of muscular nerves.

Thus, a blow upon the abdomen might cause a gravid uterus to contract but momentarily, while a stimulus to a nerve-center through a centripetal nerve may excite reflex contractions lasting some time after cessation of stimulus.

Vaso-motor reflexes may produce either dilatation or constriction of the vessels. If the constrictor reflex were but transient the resulting anemia would probably cause no serious disturbance; while the hyperemia of a dilator reflex would be attended with the same dangers previously described under shock.

Regarding the management of these cases, we should avoid operations during the third, fourth, and eighth months of pregnancy, and also during those periods when menstruation would ordinarily occur, for according to Spiegelberg these periods are specially risky.

The common method of palliative treatment and temporary fillings will dispose of a larger number. But there are some cases of difficult cavities with exposed pulps, phagedenic pericementitis, abscess, impacted third molars, and possibly other complications, where non-interference might produce the very results which we are so anxious to avoid.

Cataphoresis and other obtunding agents and the careful approach and manipulation of the dentist all exercise an exceedingly beneficial influence, but the mind still remains active and susceptible and the nerve-centers on the alert for reflexes. Something is needed to diminish both mental and physical nervous susceptibility. The combination of whiskey and morphin, as mentioned by Dr. Marshall, is an excellent agent to administer, but many ladies are so prejudiced against alcoholics that they will refuse them, but at the same time accept other poisons in proportionately large doses.

Antikamnia, or preferably antikamnia and codeia, are good preparations, as also are "migraine tablets," composed of acetanilid, monobromated camphor, and citrate of caffein. A full dose of chlorodyne just before operating produces good results. All of these agents reduce the sensibility to pain and give ease to the mind.

But the one remedy that I have used most frequently during the past two years is "bromidia," of which each fluidrachm contains fifteen grains each of chloral hydrate and potassium bromid, and one-eighth grain each of extract cannabis indica and hyoscyamus.

This preparation lowers the activity of the nervo-muscular ap-

paratus which controls uterine contractions. It is hypnotic, antispasmodic, analgesic, and anesthetic; it diminishes both physical and mental reflex activity, and also produces a pleasing mental condition.

Chlorodyne is fully as efficient as bromidia, but it is more inconvenient to administer. If the patient be very nervous, I usually begin two or three days before the operation with one-half teaspoonful of bromidia four times a day. Just before operating I note the time of last dose and condition of patient, and then give perhaps double the former dose, since the effects will be antagonized by the operation. To a number of patients, pregnant and otherwise, who previously occupied the chair in a condition of continual nervous and muscular tension—to such patients I have administered these agents with the satisfaction of rendering the patients mentally and physically tranquil in the chair, with no unpleasant results following.

Regarding the extraction of teeth, unless general anesthesia be induced the child *in utero* would be jeopardized; while only the ordinary mortality from anesthesia would apply to the mother. If the operation indicates severe pain and the patient be reasonably favorable to anesthesia, observing the usual rules for choice and contra-indications, it should certainly be implied, remembering specially that fatty degeneration and dilatation of the heart, advanced pulmonary disease, and acute nephritis are proper causes in inducing abortion and also contra-indicate anesthesia. In these cases we may operate without anesthesia, and if an abortion follows it follows from justifiable cause.

Discussion.

Dr. H. A. Smith thought the members of the society would agree with him that this was a valuable contribution to the subject. It gives a pretty good idea of the causes of abortion. In a pregnant woman the organs are in a state of abnormal activity, and any impairment of the teeth will cause an impulse to the nerve-centers, and from them, by reflex action, to the organs of generation. Another cause is systemic, such as syphilis or smallpox. The use of any anesthetic or the breathing of noxious gases may produce abortion. Certain women are habitual abortists. If we operate for such women and an abortion follows, it would probably be attributed to the operation, though falsely. There are also accidental causes, such as an injury from a fall or a blow, and psychical causes, as fear, anxiety, or fright.

Usually it would be better not to treat the teeth during this period, except temporarily. We should not extract if it can be avoided. In some cases we might slip a rubber ring over a tooth, which would gradually work its way under the gum and the tooth would extract itself.

A phase of the subject not spoken of in the paper might be worth considering. This is maternal impressions. A profound impression made upon the mother may affect the child, either mentally or physically.

Dr. C. R. BUTLER said the author had gone over the field indicated by the title of the paper very completely. He seems to be fully convinced that the course he assented to in the case which led to the writing of the paper was unsafe. Under the same circumstances he would not now operate. This paper will be a warning especially needed by many of the younger dentists.

We should temporize with the pregnant patient as much as possible. In the use of anesthetics we should be very cautious. The administration of nitrous oxid or a little ether only to the point that has been spoken of as "the ether glow" will be the safest course. The manner of the operator has much to do with calming the patient. It should be not only kind, but firm. This will serve to avoid excitement and opposition.

He did not believe the statement of the gynecologists that so great a proportion of women are diseased in their pelvic organs. There are some specialists with hobbies, and they imagine every case needs their special services.

Dr. OTTO ARNOLD said the reason for the use of an anesthetic for an operation during pregnancy was to avoid the possibility of shock, and in his opinion the way to avoid this would be to get a profound anesthesia. To go only so far as to get the ether glow would be dangerous, and liable to produce shock.

Dr. SMITH was not ready to admit that the reason we administer anesthesia was to avoid shock. It is to allay the sensations of fear and pain, whether we produce profound anesthesia or not, and it is a question which is to be preferred. Dr. Hamilton insists that dentists are not justified in carrying their patients to a state of profound anesthesia.

Dr. CUSTER, closing the discussion, said that he did not think nitrous oxid administered during pregnancy would be liable to cause abortion because it was a noxious gas, though an extraction of one or more teeth while the patient was under its influence might, by causing shock or excitement. It seemed possible that an effect could be produced upon a child *in utero* by a dental operation upon the mother, though he had never heard of such a case. About the most dangerous period of pregnancy he was not sure, and thought abortion might be brought on at any period.

The subject was passed, and the convention adjourned to meet at 6.30 for the election of officers.

Evening Session.

The convention met at 6.30, and proceeded with the election of officers for the coming year, with the following result:

L. E. Custer, president; Grant Molyneaux, first vice-president; L. L. Barber, second vice-president; L. P. Bethel, secretary; H. F. Harvey, assistant secretary; C. I. Keely, treasurer.

The following were elected to the Board of Directors, to serve three years: O. N. Heise, C. M. Wright, J. R. Callahan, and W. D. Snyder.

(To be continued.)

DENTAL SOCIETY ANNOUNCEMENTS.

St. Louis Dental Society.

The officers for 1897 are as follows: John H. Kennerly, president; P. H. Eisloeffel, vice-president; John G. Harper, corresponding secretary; C. C. Cowderly, recording secretary; A. J. Prosser, treasurer; J. H. Pfaff, J. P. Harper, Wm. Conrad, committee on ethics; F. F. Fletcher, W. M. Bartlett, DeC. Lindsley, committee on publication.

Colorado State Board of Dental Examiners.

At an election held December 30, 1896, Dr. M. H. Smith, of Colorado Springs, was elected president, and B. W. Rogers, of Denver, was elected secretary of the Colorado State Board of Dental Examiners.

B. W. Rogers, *Secretary.*

Louisiana State Board of Examining Dentists.

The Governor has recently appointed the following as the board of examining dentists: A. G. Friedrichs, M.D., M. R. Fisher, D.D.S., C. B. Johnston, D.D.S., T. M. Comegys, D.D.S,, C. V. Vignes, D.D.S. At a meeting of the board Dr. Andrew G. Friedrichs was made president, and Dr. C. V. Vignes secretary. The board will hold its annual meeting in New Orleans on the 4th of March (the day after Mardi-Gras).

C. V. Vignes, *Secretary.*
Corner Bourbon and Canal sts., New Orleans, La.

EDITORIAL.

Dr. Williams's Studies of Enamel.

The exhibit made by Dr. J. Leon Williams at the recent meeting of the New York Odontological Society was an event of more than ordinary importance to dentistry. The paper, illustrated by about one hundred photo-micrographs, was a statement of the results of an investigation to which the author has devoted much of his time for the past two years. The outcome of this research is a demonstration in detail of the rôle played by micro-organisms in the disintegration of enamel. The researches of Miller have dealt more particularly with the nature of the bacteria involved in the carious process, their life-history and mode of action, especially in relation to caries of dentin; and while he distinctly foreshadows the probable nature of enamel dissolution through the agency of bacterial forms, he has given no exhaustive presentation of the details of

enamel dissolution. Further light has been needed upon the problem of caries in its incipiency, not only because of the abstract pathological interest which attaches to the question, but because of its important bearing upon the clinical aspect of dentistry. For example, the bacterial origin of dental caries, even despite the demonstrations of Miller, does not lack opponents who hold that the theory is inadequate as an explanation of the etiology of the disease; that imperfections or inherent weakness of tooth-structure, in conjunction with systemic predisposition, are largely responsible for the disorder. Again, it is held that irregularities of the tooth-surface, sulci or fissures, pits or fractures in the enamel-covering, are a necessary predisposing factor in the development of carious areas in order that fermenting carbohydrates may find a lodgment and furnish the acids necessary for enamel dissolution. Not only the foregoing, but the whole question of the predisposing cause or causes of dental caries, has needed and still needs clearing up; for until that is accomplished we must continue to bear the reproach that "though the dental profession are wonderful patchers-up of broken-down dental organs, they have accomplished but little in the prophylaxis of the teeth against the carious process." When we have exactly defined the whole nature of the etiology of dental caries, we will have then made the first and most important step toward its prevention. The research of Dr. Williams supplies an important link in the chain of evidence that will in time complete the picture of the etiology of dental caries. His paper and exhibit were not the presentment of a theory, but the demonstration of certain facts that may be easily verified by all who care to study them. He shows that the morphology of the tooth-surface is not the predisposing cause of dental caries, nor is the density or lack of density of its structure; but it is the environment of the tooth which is solely concerned in the production of the disease. This conclusion has been foreshadowed, if not enunciated, by both Miller and Black, though it has been reached by the latter through a different line of research. Dr. Williams's demonstration places the truth of it beyond the possibility of doubt by a comparative study of enamel faults and imperfections of structure in the human teeth with exactly similar defects in teeth of the lower animals, showing that in the former the enamel defects were the seat of caries, either incipient or fully established, while in the similar defects of the latter the disease was absent.

It is further shown that while irregularities of tooth-surface in the human subject favor the retention of bacterial forms by affording them protection from dislodgment, such irregularities and

defects are by no means a necessary predisposing factor. By skillful methods of microscopical technique, specimens have been prepared showing masses of micro-organisms *in situ* in close adherence with the smooth enamel of the approximal surface, and extending over the masticating surface of the crown as a continuous film-like covering. This band of adherent germ-growth has the appearance of a growth of algæ upon a log immersed in water, and its attachment is so persistent that it has not been disturbed by the processes of grinding and mounting the specimen. Immediately subjacent to this band of bacterial deposit, the solvent action of the acid products of fermentation induced by the bacteria is plainly evident upon the enamel-structure.

From this it will be seen that the means of retention of bacteria *in situ* is the formation of a closely-matted mass of micro-organisms, covering the tooth as a film, and that their adherence to the enamel is quite independent of mechanical irregularities of the enamel surface. It is evident, then, that the removal of this film by the detersive action of suitable dentifrices is as important a consideration in the prophylaxis of the teeth against caries as their antiseptic treatment.

The method of enamel disintegration by the acid products of bacterial action is a most interesting and important feature brought out by this research. All of the photo-micrographs bearing upon that phase of the subject, whether it be at the incipiency of the destructive process or in its final stages, show clearly a marked difference in the solubility of the calcoglobulin which makes up the completely formed enamel-prism, and that of the amorphous or granular calcoglobulin which forms the interprismatic cementing substance and the stratum granulosum as well. The disintegrating process in all cases follows the line of least resistance, which is determined by the greater solubility of the granular calcoglobulin referred to; the interprismatic substance being first dissolved out, the enamel-prisms fall apart.

This fact of the difference in solubility of the enamel-prisms and of the amorphous calcoglobulin respectively would seem to throw light upon the relative differences which are everywhere clinically observed in the resistance of different teeth to the carious process. Dr. Black's researches and those of Tomes tend to show that with respect to density and to ultimate chemical composition the variations in teeth of all classes are extremely slight,—so slight that Dr. Black states, in effect, that with respect to their power to resist caries the terms hard teeth or soft teeth cut no figure whatever; and both Dr. Black and Dr. Williams agree in regarding

the environment of the tooth as the sole predisposing factor in the production of dental caries. Resistance to mechanical stress is one thing, however, and resistance to the solvent action of an acid is another. It is not surprising that calcoglobulin, as regularly laid down in the enamel-prism or as deposited amorphously as interprismatic substance, should have the same ultimate chemical composition; and having the same chemical composition, it is no more surprising that it should exhibit about the same resistance to mechanical stress. But given the wide difference in solubility of the two classes of calcoglobulin as shown in the preparations of Dr. Williams, the question of resistance to caries becomes a question not of density or chemical composition, but of the relative proportion of amorphous calcoglobulin to regularly calcified and normally-arranged cellular calcoglobulin, and the relative solubility of these two varieties of calcoglobulin in lactic acid. The conditions of enamel dissolution shown by Dr. Williams are strictly analogous to those shown by Professor Tyndall in his ingenious and beautiful experiment for demonstrating what he termed the uncrystallization of ice. An apparently amorphous plate of clear ice was interposed in the beam of light from a projecting lantern, and the transmitted beam focussed upon the screen by means of a photographic objective. The heat rays from the lantern caused the crystals of ice to fall apart by the melting of their binding material of congealed water, showing that though the body was apparently amorphous and of the same chemical composition and density throughout, yet it contained ice crystals which became fluid less rapidly, under the influence of heat, than the inter-crystalline ice.

The first instalment of Dr. Williams's paper will appear in the next issue of the DENTAL COSMOS; it will be fully illustrated, and we bespeak for it the careful study which its importance demands.

ERRATUM.

IN the article by Dr. Weld on "Disinfectants," etc., in the January number of the DENTAL COSMOS, two *decimal points* were omitted in the table referring to euthymol as an antiseptic. At the foot of page 28, first column, it reads 75 per cent.; should read .75 per cent. Next column, 5 per cent.; should read 1.5 per cent.

BIBLIOGRAPHICAL.

COMPEND OF DENTAL PATHOLOGY AND THERAPEUTICS. By HENRY BURCHARD, M.D., D.D.S., Special Lecturer upon Dental Pathology and Therapeutics, Philadelphia Dental College. Philadelphia: The S. S. White Dental Mfg. Co., 1896. Price, cloth, $1.75, net.

Some one characterized quiz compends in general as "mental crutches for lame students," and as far as many of the productions of that class are concerned, the appellation is not without grounds for its support. They are labor-saving inventions for the lazy, and are too frequently used as cramming machines to enable students to pass examinations or to furnish ready-made questions for the use of examining boards. The misuse of a plan or principle is no argument, however, against its legitimate use, and this distinction applies forcibly to the average compend in comparison with the work under consideration. It is not a bald recital of facts, a mass of data strung together to be memorized, but the embodiment of carefully selected and related principles in their logical order, so stated that the student of average mental capacity who has listened to the didactic presentation of the matter should find no difficulty in comprehending and assimilating the principles set forth.

The logical arrangement of the matter is easily brought out by divesting the text of its interrogative feature and reading only the answers to the questions. It will then be seen that the author's purpose to make the work a presentation of principles has been closely adhered to, and make clear the fact that it is not one of the many manifestations of the drop-a-nickel-in-the-slot device which have invaded the realms of mental effort as substitutes for honest intellectual labor. The book is highly suggestive throughout; it represents the latest thought upon the subjects within its scope, and to both students and teachers it should prove a valuable help as a guide in the acquisition and the imparting of knowledge in its branch.

ARTIFICIAL ANÆSTHESIA: A MANUAL OF ANÆSTHETIC AGENTS, AND THEIR EMPLOYMENT IN THE TREATMENT OF DISEASE. By LAURENCE TURNBULL, M.D., Ph.G., Aural Surgeon at the Jefferson Medical College Hospital, etc., etc. Fourth edition, revised and enlarged. With illustrations. Philadelphia: P. Blakiston, Son & Co., 1896. Price, cloth, $2.50.

The fourth edition of this standard work is a marked improvement upon its predecessors. The text has been thoroughly revised,

and received many important additions. Turnbull's "Artificial Anæsthesia" is a work peculiar to itself. It contains more varied and valuable information on the subject than any other work within our knowledge. There are others which more exhaustively treat certain phases of the subject, but none which so satisfactorily cover the whole field as this one. The positive ground which the able and experienced author takes with respect to the relative safety of ether over other agents used for inducing artificial anesthesia, especially as compared with chloroform, is most gratifying. The persistent use of chloroform as an anesthetic, in spite of the ghastly record of fatalities caused by it, is a matter which should be controlled by statute. The presentation of facts as to the relative safety of ether as compared with chloroform should leave no doubt as to the great hazard to human life connected with the use of the latter agent.

The latest developments, both theoretical and practical, in relation to nitrous oxid as an anesthetic are clearly set forth, and a most timely and valuable presentment of the action of cocain and eucain as local anesthetic agents is given.

The book should be read by every one who assumes the responsibility of inducing the anesthetic state, and were its teachings more generally known, the danger connected with the anesthetic procedure would be materially lessened.

THE HOME AND HAUNTS OF SHAKESPEARE. Stratford Edition. By JAMES LEON WILLIAMS, D.D.S., with an introduction by Horace Howard Furness, LL.D. New York: Charles Scribner & Sons, Publishers.

To the lover of Shakespeare,—and who is not in some degree?—the scenes which surrounded him as youth and man must always possess a fascinating influence. No one has yet put into words the subtle attractiveness of that corner of Warwickshire with which his life was associated. The visitor to Shakespeare's country is quickly brought under its spell, and carries away its impress indelibly stamped upon his life; but it is too elusive to translate into words, and the story is never told. Dr. Williams has, however, most nearly approached it in the wonderful pictorial delineation which he has embodied in this work. He has caught the spirit of the place, and with the sympathetic quality of the true artist has reproduced as accurately as photographic art can the scenes made immortal by the life of the greatest of men. By those who have had the privilege of visiting these scenes, "The Home and Haunts of Shakespeare" will be welcomed for the vividness with which it

revives the beauty of the place and its delightful experiences; while to those who desire but have not yet had the opportunity for the experience of a personal inspection of the reality, the work of Dr. Williams furnishes the best and most satisfactory substitute.

OBITUARY.

Carl Heitzmann, M.D.

Died, at Rome, Italy, December 6, 1896, of hypertrophy of the heart, Dr. Carl Heitzmann, in the sixty-first year of his age.

Dr. Heitzmann graduated at the University of Vienna in 1859. Ten years later he appeared as collaborateur with Professor Wedl in the works on pathology of the teeth and the accompanying atlas which at once established his reputation as an anatomist and pathologist. He was the author of a standard text-book upon Descriptive and Topographical Anatomy which still receives popular recognition as a text-book in Germany. But it is because of his microscopical researches and original views respecting the ultimate structure of tissues that his reputation as a scientific investigator will endure. He developed a school or cult of followers who gave adherence to his teachings. The most pronounced of his theories and that which achieved much prominence was his so-called "reticulum theory" of protoplasmic matter as opposed to the cellular theory of Virchow and others. The acceptance which his reticulum theory gained among his pupils and readers was in great measure due to the aggressive personality of its originator. He not only urged its acceptance with an almost imperious forcefulness, but was correspondingly intolerant of views opposed to his own. There can be no doubt of the fact that his faith in his own conclusions was based upon his firm conviction as to their accuracy, and, indeed, it may be truthfully said that whatever of dispute there may have been as to his work it pertained solely to his deductions and conclusions—not to his ability as an observer.

In 1877 his laboratory in New York was opened to a number of dental practitioners of that city, who placed themselves under his instructions. The outgrowth of the investigations of these men under the guiding spirit of their teacher was not only a decided addition to our knowledge of dental histology, but, what was of vastly more importance, it initiated and developed an interest in scientific research in dentistry which has been of incalculable benefit to our profession. The enthusiasm and personal magnetism of Heitzmann were exceptional. He was a born teacher, gifted by nature with the qualifications for his calling, highly cultivated by study and experience, and he irresistibly carried his pupils toward the goal of his own conclusions, making of them enthusiasts like himself.

His death came before he saw his theories achieve that general acceptance which he firmly believed would in the course of time be accorded them. Perhaps he has mercifully escaped the disappointment which their annihilation would have caused him, but those who knew him as the man as well as the scientist will believe that he was broad enough to have gracefully, even joyfully, accepted the truth even though some other than himself

had been its torchbearer. He will live in his works, but not in these only, for in the hearts of those to whom his generous, kindly nature was more intimately manifested, he is enshrined most truly and lastingly.

HINTS, QUERIES, AND COMMENTS.

To the Editor of the Dental Cosmos:

Sir,—Having been a close student of the application of electricity to dentistry ever since I first commenced the study of dentistry, I have read with considerable satisfaction the various articles upon the subject, more especially those bearing upon the special use of cataphoresis, that have appeared in the Cosmos and other journals.

In the articles I have read, I find that only a few mention or suggest the carrying of the cataphoric process so far as to painlessly remove exposed pulps.

Having experimented to no small extent with this idea in view, and having gone, as I believe, a step farther than those who have reported on this subject, I venture to ask your indulgence in placing my experience before the profession, with a view to eliciting further reports and investigation in this direction.

My first experiments were conducted solely with a view to removing the exposed pulp by electricity, with little or no pain. This I accomplished after repeated experiments, as follows:

I first rendered the pulp non-sensitive by the process which I then called electrolysis, using a crystal of cocain hydrochlorid and a drop of water, in the tooth with the positive pole; this I did very readily in four or five minutes. I then exchanged the ball point electrode for a very fine platinum broach, which, after drying out the tooth, I inserted into the anesthetized pulp, reversed the current, making the pole applied to the pulp the negative. By this process I was enabled to entirely decompose and remove the pulp, and so thoroughly clean the root-canals that they could be filled at once. The addition of a drop of water with a few grains of common salt will sometimes hasten the decomposition.

I also removed the pulp in two cases, one that of an upper central that had been broken off, and the other that of a lower left second bicuspid badly decayed, as follows: I proceeded as before up to inserting the broach into the tooth; at that point I allowed the pole at the tooth to remain on the positive and turned the current on gradually as it became painful; then allowed it to remain a few seconds. The pulp tissue was seared onto the broach so that the entire pulp was removed with the broach.

My current was from three 150 ampere-hour storage cells connected in series, giving me six volts maximum. I had no meters, and therefore lack minute data, but know that I did not use at any time the full strength of the cells.

My greatest difficulty was to secure a patient who would consent to the use of electricity.

Believing this will be of interest to those investigating in these lines, I am, very truly, yours, A. F. Wineman, D.D.S., Chicago, Ill.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING DECEMBER, 1896.

December 1.—No. 572,310, to C. O. PERKINS. Hand-piece for dental engines.
" *15.*—No. 573,147, to G. T HIGGINS. Head-rest.
" " No. 573,361, to G. W. SCHWARTZ and B. J. CIGRAND. Dental furnace.
" " No. 573,133, to A. W. BROWNE. Dental chair.
" *29.*—No. 574,012, to J. M. STROUT. Dental matrix carrier and retainer.
" " No. 574,025, to H. A. EDGECOMB Dental plugger or mallet.
" " No. 574 031, to G. B. HAKINS. Dental disk-holder.
" " No. 574,033, to M. W. HOLLINGSWORTH. Appliance for bleaching teeth.

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ORIGINAL COMMUNICATIONS.

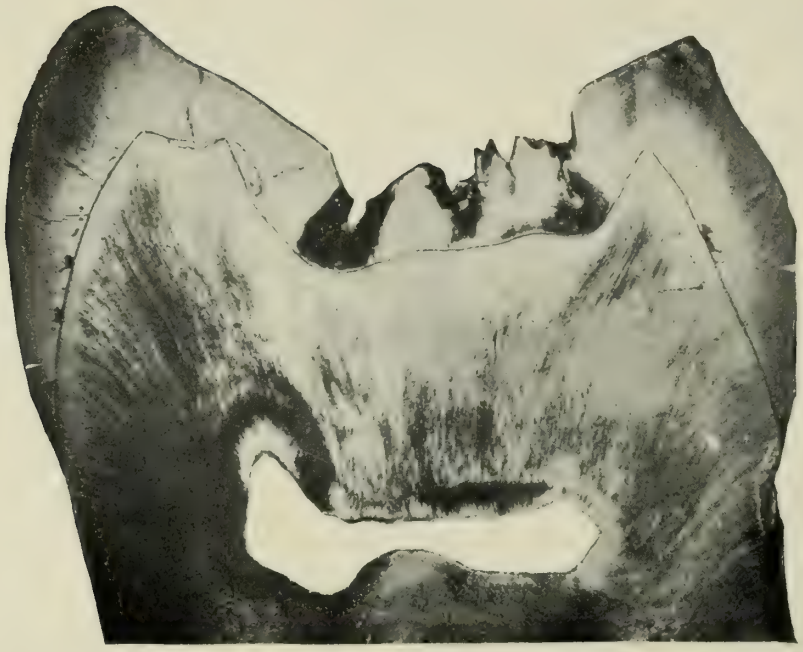
A CONTRIBUTION TO THE STUDY OF PATHOLOGY OF ENAMEL.

BY J. LEON WILLIAMS, D.D.S., L.D.S., LONDON, ENG.

(Read before the New York Odontological Society, January 12, 1897.)

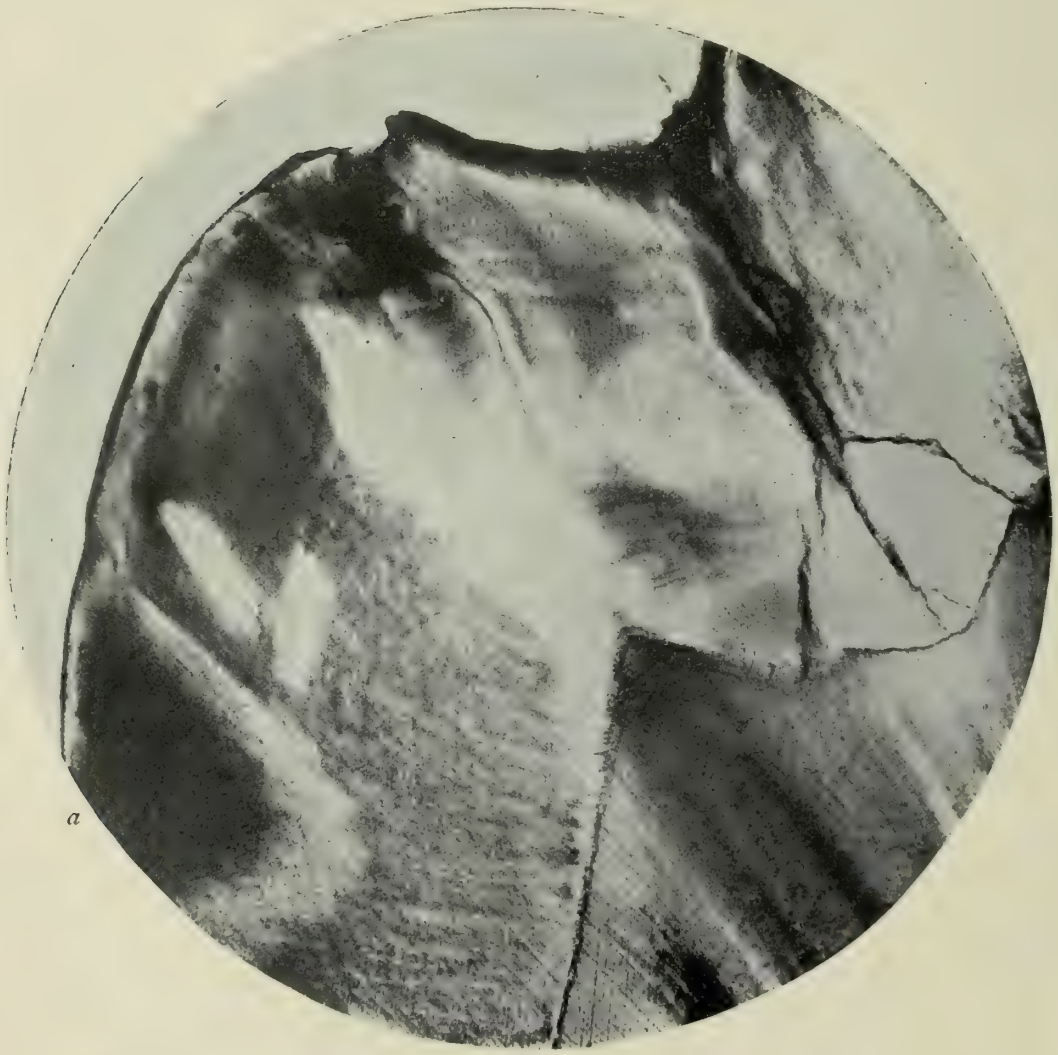
I ASK your indulgence for the length of a paper which, I fear, may prove wearisome to many of you. The recital of a detailed record of unadorned scientific facts is usually not a very enlivening performance, although under certain circumstances it may become a very necessary and useful one. When you recollect that the subject of my paper has supplied matter for theorizing and disputation for half a century or more you will, I am sure, support me in my desire to make so complete an examination and presentation of the factors of the problems involved as shall enable us to reach, if not a complete solution of the entire question, at least a solid basis of agreement as to the direction in which future investigation should proceed. The need and desirability of reaching such a basis of agreement is plainly apparent in almost every issue of our best dental journals. It has now been about a dozen years since Dr. W. D. Miller gave us his classic contributions on the cause of dental caries. It was the last and most brilliant of a long series of investigations conducted along similar lines by many eminent scientific workers, and some of us thought the question concluded and settled with the publication of Dr. Miller's papers. But in a late number of the DENTAL COSMOS there appears the report of a paper read before one of the leading dental societies of this country in which the opinion was expressed that far too much importance had been ascribed to micro-organisms in relation to decay of the teeth. One gentleman who has long stood at the head of one of our best-known dental colleges goes further than this, and asserts positively that micro-organisms do not play any important part in the process of dental caries.

FIG. 1.



ANTERO-POSTERIOR SECTION LOWER MOLAR, HUMAN. × 12.
Showing defects of structure in the vicinity of sulci.

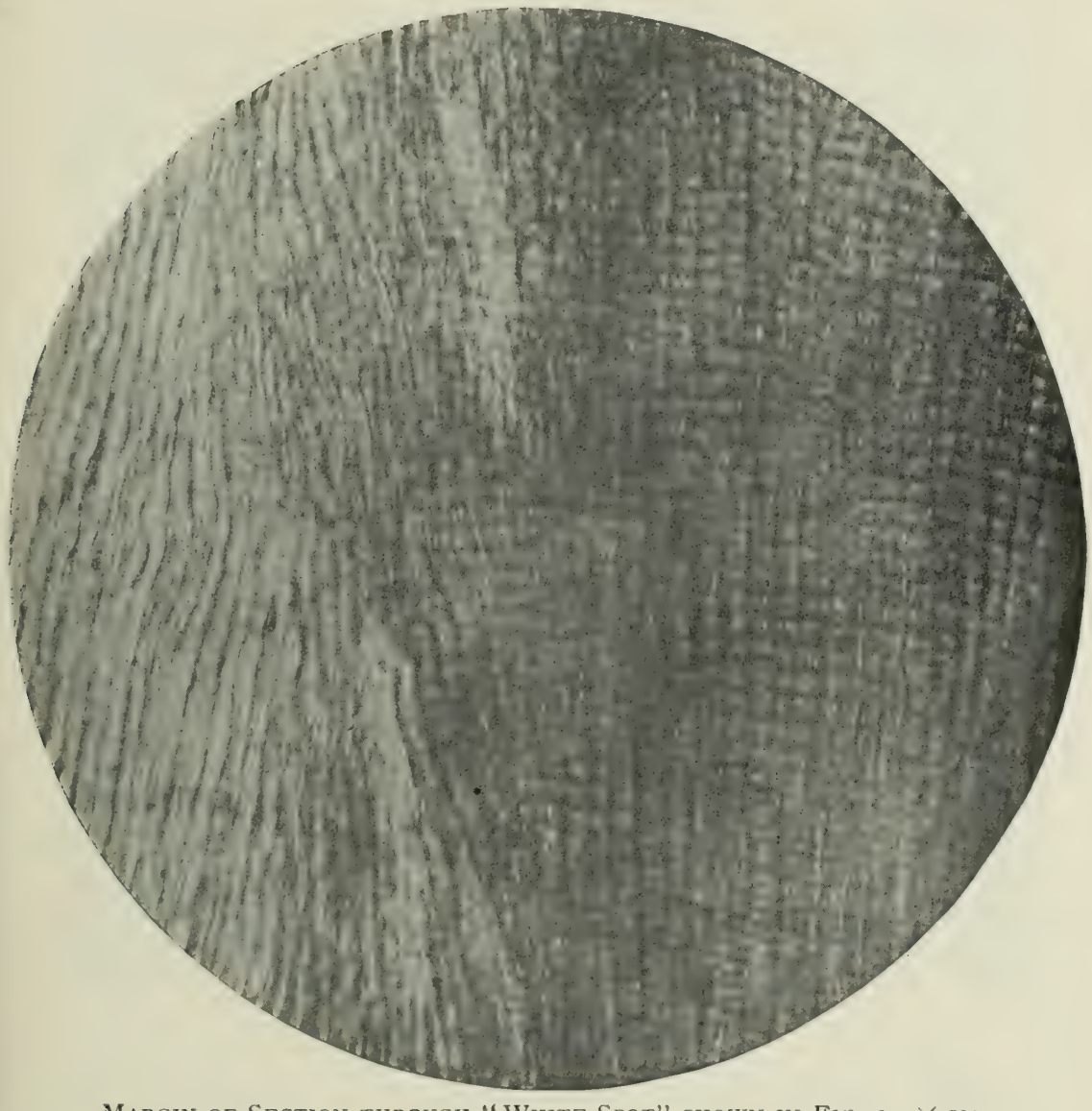
FIG. 2.



SECTION OF CUSP OF LOWER MOLAR, HUMAN. × 75.
Showing so-called "White Spot," *a*, on left of illustration, and also other defects of structure.

Dr. Black's report of his recent work, which is hardly less important than Dr. Miller's, has been generally received in silence or with openly expressed doubt. In considering this attitude of many members of our profession I have, after granting all that can be said about that ultra-conservatism which often hangs like the dead weight of fetters about the feet of progress, been forced to acknowledge to myself that there is one phase of the problem of dental caries which has never been satisfactorily cleared up from the illustrative standpoint. I refer to the very inception of the process at

FIG. 3.



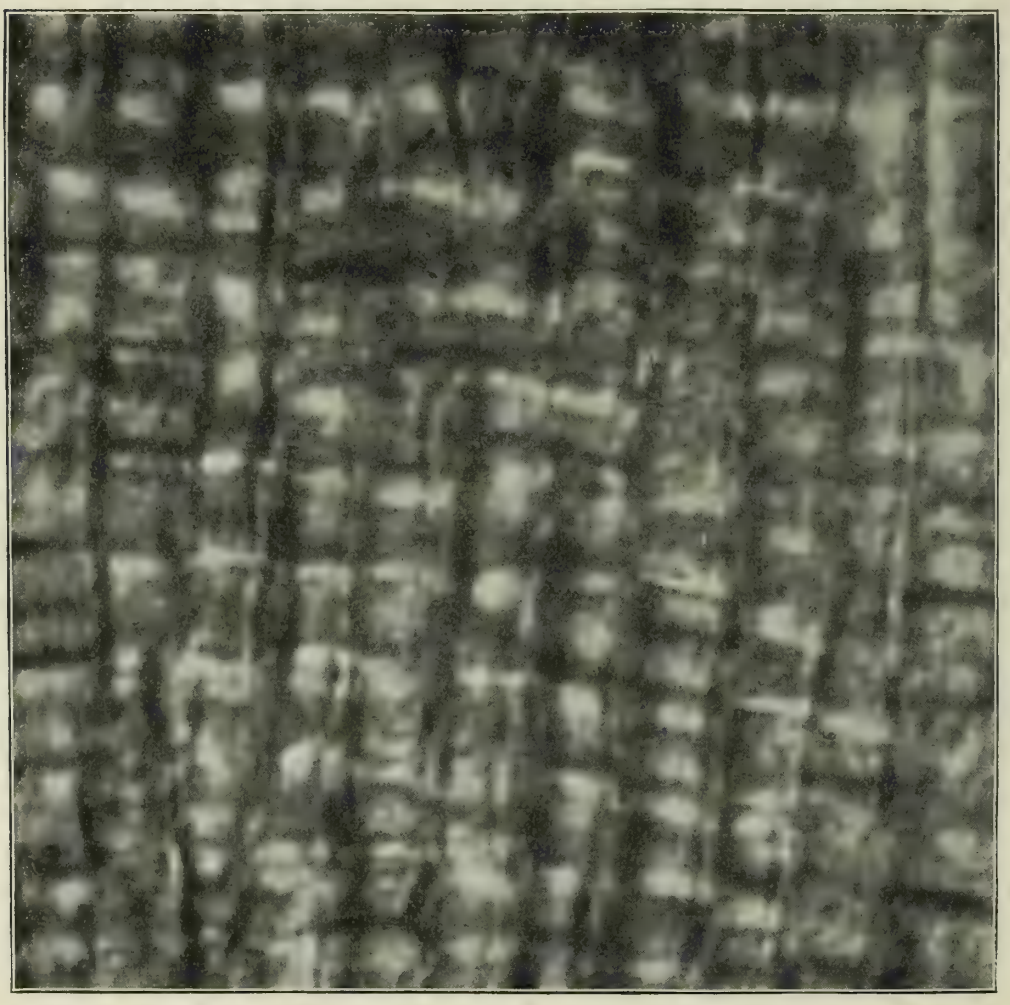
MARGIN OF SECTION THROUGH "WHITE SPOT" SHOWN IN FIG. 2. × 500.

the commencement of decay of enamel. If this had ever been clearly shown we should not, I think, have had so much doubt and discussion about the matter; for, obviously, a continuation of the beginning of the process is all that is required for a complete explanation of the phenomena. It is true, of course, that logical inferences from Dr. Miller's demonstrations would keep us very near the truth as to the beginning of caries, but I fear there are many occupying high and influential positions in the dental profession whose deductions are not always the result of the most inflexible

logic. Perhaps these individuals distrust logic. In any event if bacteria had ever been photographed and shown beginning the formation of a cavity on the surface of sound enamel of normal structure there would have been no possibility of disputing the demonstrated fact, and, possibly, no disposition to do so.

With reference to the predisposing causes of caries I am quite well aware that notwithstanding the conclusions reached by Dr. Black, the opinion is still generally held by the dental profession that decay of the teeth is primarily due to a degeneration which

FIG. 4.



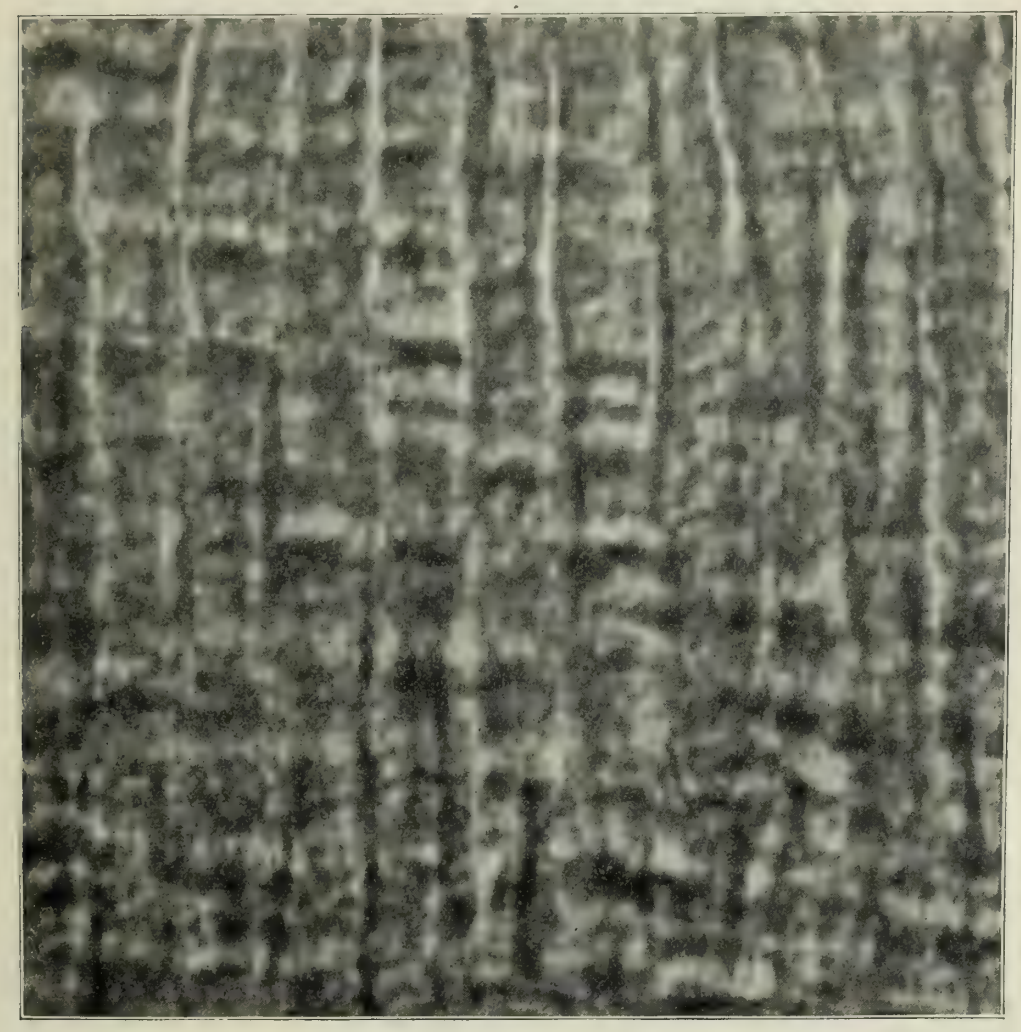
A PORTION OF THE "WHITE SPOT" SHOWN IN FIG. 3. × 2000.

has taken place in the tissues of these organs. Ask a dozen dentists as you meet them why human teeth are decaying so freely and rapidly to-day while the teeth of animals are not, and a majority of them will answer: because the structure of human teeth is not so good as that found in the teeth of animals. If I ask whether any one has made a scientific and exhaustive comparison of the structure of the teeth of men and animals, they must reply, no. Then the answer to the above question is a pure gratuitous assumption, is it not? Certainly, that is precisely what it is. It is an opinion which has come from the habit of going to nature with a preconceived notion as to how things should be; it is the result of

a biased judgment founded on an observation of a few of the less important facts of the problem.

One occasionally meets with cases of well-marked degeneration in the minute structure of human teeth, but these isolated instances do not constitute one-tenth of one per cent. of the teeth which decay. Notwithstanding this, the writers on pathology of enamel, and all who have contended that structure is the chief predisposing cause of caries, have seized upon these exceptional cases for illustration and for material in their attempts to prove the great degeneracy of the enamel of modern teeth.

FIG. 5.



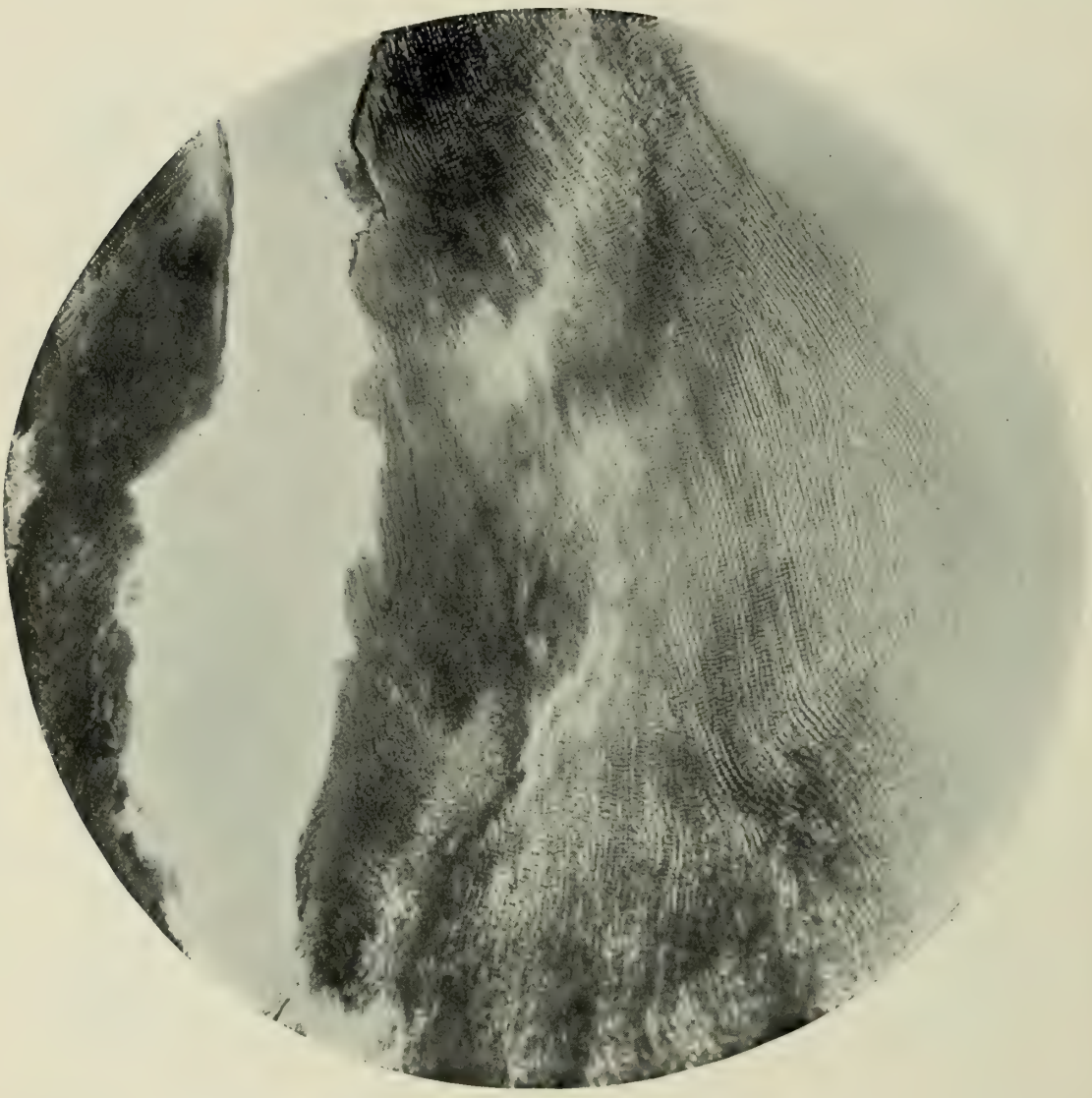
SECTION THROUGH HUMAN ENAMEL, SHOWING FIRST STAGES OF DECAY. × 2000.

What proportion of rapidly decaying teeth as they are presented day after day to the dentist are syphilitic or rachitic? What proportion of teeth that you are called upon to treat are half denuded of enamel? Perhaps one in ten thousand, but probably less. What we most want is not an explanation of the carious destruction of that one rachitic or syphilitic tooth in ten thousand, but the reason why decay occurs in the other nine thousand nine hundred and ninety-nine teeth which are apparently normal.

If you contend that instances of marked degeneration of the structure of teeth are not so rare as my statement would indicate,

I must reply by asking you what you propose to accept as your standard of normality. I know of no better, or, in fact, of no other way of establishing such a standard than to found it on the structure of the enamel of teeth from the wild races of men who suffer but little from caries, or from the teeth of those wild animals which stand next to man. If you accept this proposition (and I do not see how you can avoid doing so), I shall be able to show you that nearly every microscopical feature of the structure of teeth, ex-

FIG. 6.



SECTION THROUGH HUMAN MOLAR, SHOWING APPEARANCE OF ENAMEL IN THE VICINITY OF A SULCUS. × 125.

cepting, of course, decaying tissue, which has been described and illustrated as pathological, is to be frequently observed in these types which must be selected as the highest to be found. And this is only one out of several unanswerable arguments, perhaps I should say proofs, against the claim that structure and not environment is the principal predisposing cause of caries. But in considering the predisposing causes of caries the same principle of priority in importance of position of the enamel should be observed as in our investigation of the active causes of decay. From this

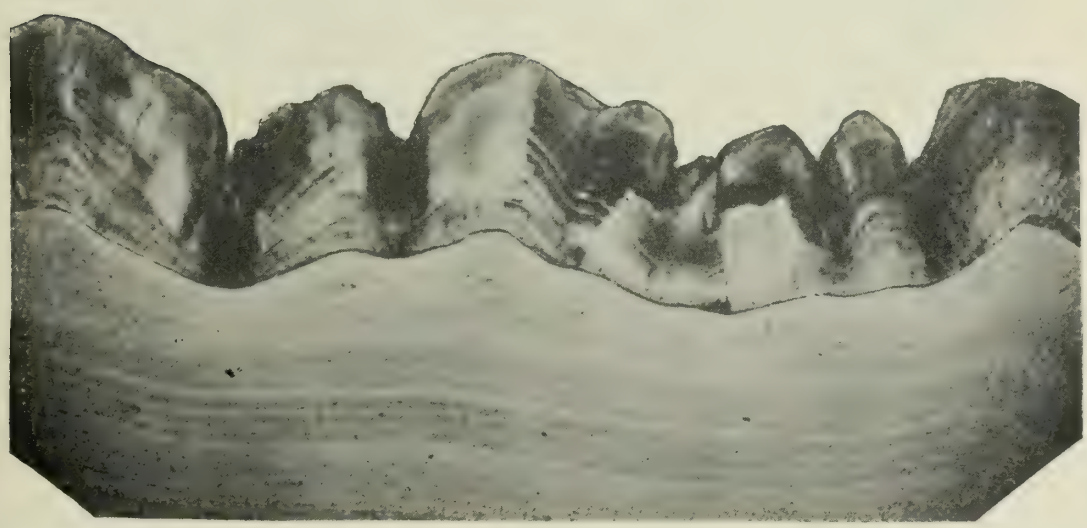
point of view there seems to be great weight in one of Dr. Truman's criticisms on Dr. Black's recent work. He says, with reference to dentin having been chosen for experiment as the tissue best calculated to represent the character of the entire tooth, that

FIG. 7.



SECTION OF HUMAN ENAMEL, SHOWING APPEARANCES PRODUCED BY ACID OF DECAY. × 100.

FIG. 8.

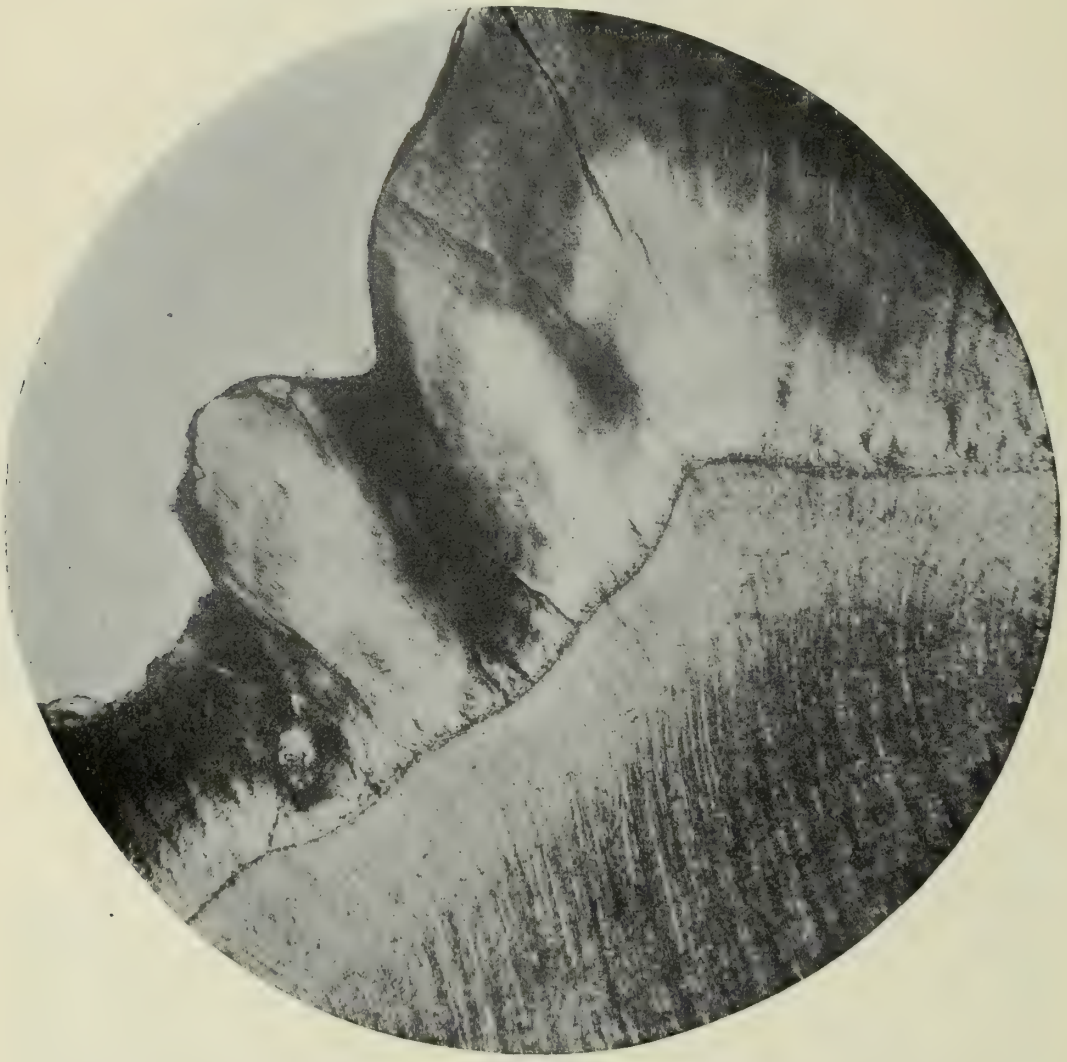


SECTION THROUGH GRINDING-SURFACE OF MOLAR OF GORILLA. × 20.
Shows deep and numerous sulci and many other defects of structure.

"the propriety of this selection may well be questioned in view of the fact that it is not dentin that is the resisting body against the attack of caries, and that, therefore, inferences drawn from experi-

ments on this tissue must be largely fallacious; or, at least, they can have no force as antagonists to clinical observation." If Dr. Truman's premises be granted, the logic of his statement is apparent so far as it applies to the liability of the teeth to be attacked by caries. In fact, it is obvious from Dr. Black's own statement as well as from clinical experience, and the reason of the matter that if caries once penetrates the enamel the most perfectly formed dentin cannot withstand the destructive agents. On the other hand,

FIG. 9.



SECTION THROUGH PORTION OF CUSP AND GRINDING-SURFACE OF ORANG. × 50.
Shows deep sulci and granular, pigmented enamel.

so long as the enamel remains intact the character of the underlying dentin, as regards density, strength, or percentage of lime-salts, is a matter of small importance. But the premise on which Dr. Truman's argument is founded is the very bone of contention of the whole question. Dr. Black claims that the results of his investigations show that environment and not tooth-structure is the principal predisposing cause of caries. If this be admitted, then the whole force of his reasoning applies to enamel the same as it does to dentin.

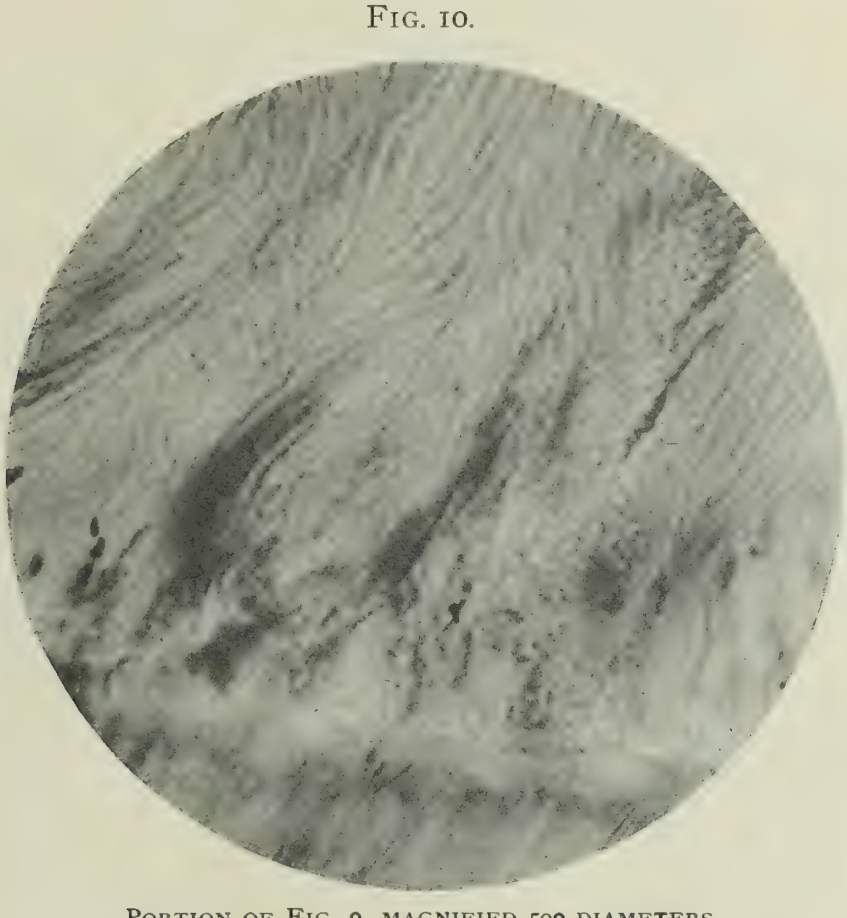
Dr. Black has said in his conclusions,—

"Imperfections of the teeth, such as pits, fissures, rough or uneven surfaces, and bad forms of interproximate contact, are causes of caries *only in the sense of giving opportunity for the action of the causes that induce caries.*"

In further elaboration of this point he also says, while admitting the importance of structural defects and outward configuration, that these points are all "insufficient to explain the facts clinically observed, or the wide variations that are presented in the disposition of caries to attack the teeth of different individuals."

I regard that as a complete and impartial statement of the case. It contains the utmost that can possibly be said concerning the

FIG. 10.



PORTION OF FIG. 9, MAGNIFIED 500 DIAMETERS.
Shows very defective structure of enamel near the line of union with dentin.

significance of structural defects in enamel in relation to caries. And I maintain that those conditions do not come within the proper scope and meaning of a "predisposing cause." In Gould's "Dictionary of Medicine" "predisposition" is defined as follows:

"That condition of the body in which causes that leave other persons unaffected call forth an attack of disease in individuals predisposed. The term at the present time refers especially to susceptibility to infectious diseases, and implies a peculiar condition of the bodily juices or cells, in which these are unable to repel the invasion of pathogenic micro-organisms."

Accepting that definition completely, I contend that Dr. Black's position is quite impregnable so far as the structure of dentin is concerned in relation to caries. Hand in hand with this magnified importance of tooth-structure considered in relation to caries there

has always been another erroneous notion which is apparently quite as deep seated. It is that completely formed enamel may fluctuate between a physiological and a pathological condition; that it is subject under certain conditions to a kind of retrograde metamorphosis, and that from this state it may again recover its normal condition. In the same issue of the Cosmos which contained one of Dr. Black's papers there is an article written, I believe, by a gentleman who is on the professorial staff of one of the leading dental colleges of this country. The author is considering

Fig. 11.



Section of Bicuspid of Chimpanzee. × 50.
Shows numerous clefts and fissures in the enamel; also granular and pigmented tissue.

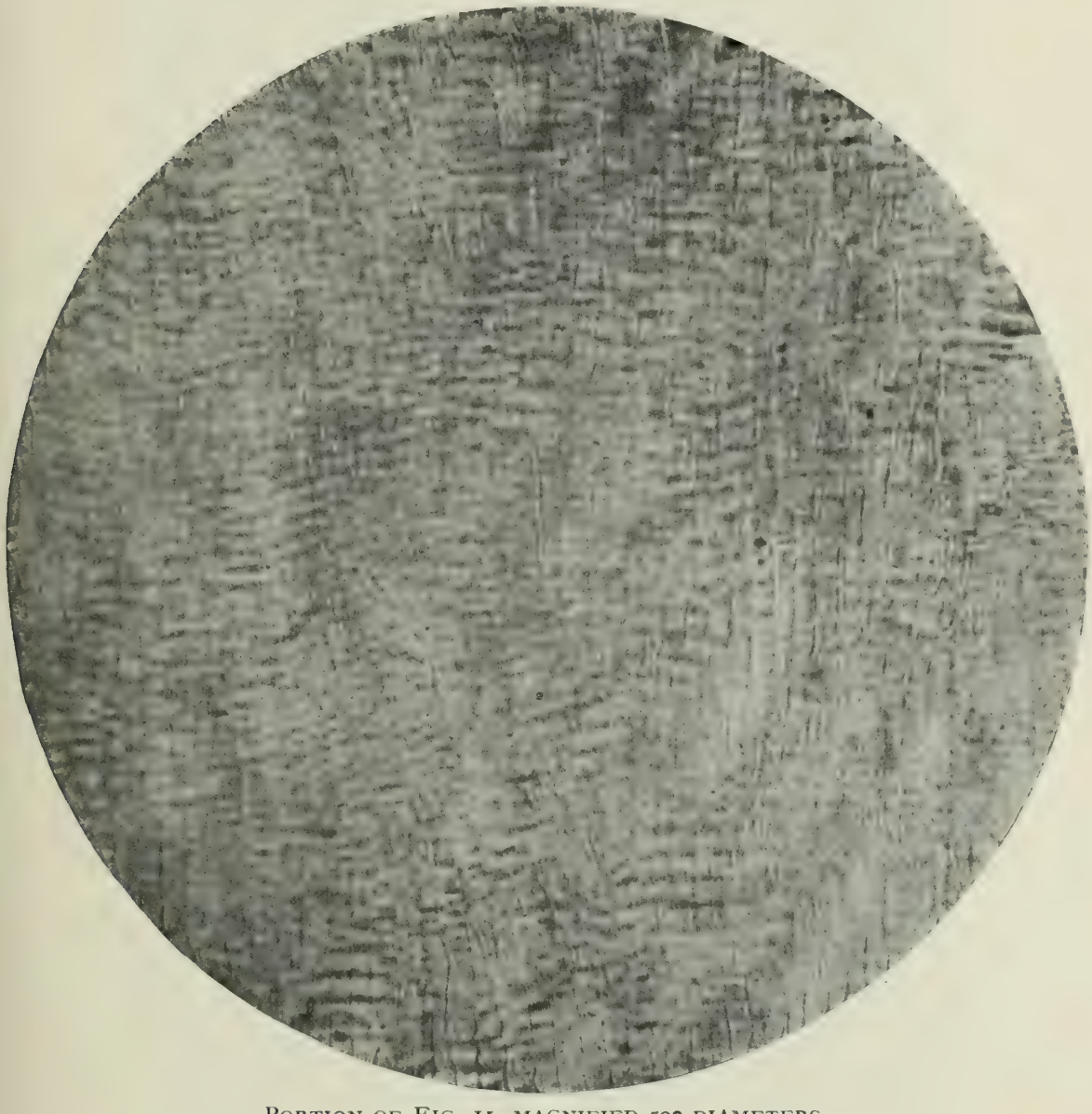
the absorption of lime from the bones of the mother during pregnancy to supply a portion of the material for building up the osseous structure of the embryo, and he says,—

"It is conceivable that under such circumstances the enamel might feel this absorptive influence and part with some of its lime, more especially from its under surface, and thus become thin and easily fractured. With the birth of the child and the re-establishment of the digestive functions, a recalcification of the bones takes place, and they return to their normal condition of solidity; could the teeth be kept free from the destructive action of bacteria and

the strain and pressure incident to mastication, they also, there is every reason to believe, would return to their normal condition of calcification."

Statements of this sort belong to the same class as the teachings of the Heitzmann school concerning the return of enamel to a protoplasmic condition and its possible subsequent recalcification. They not only set at defiance the simplest anatomical facts of enamel-structure, but they also completely ignore the fundamental

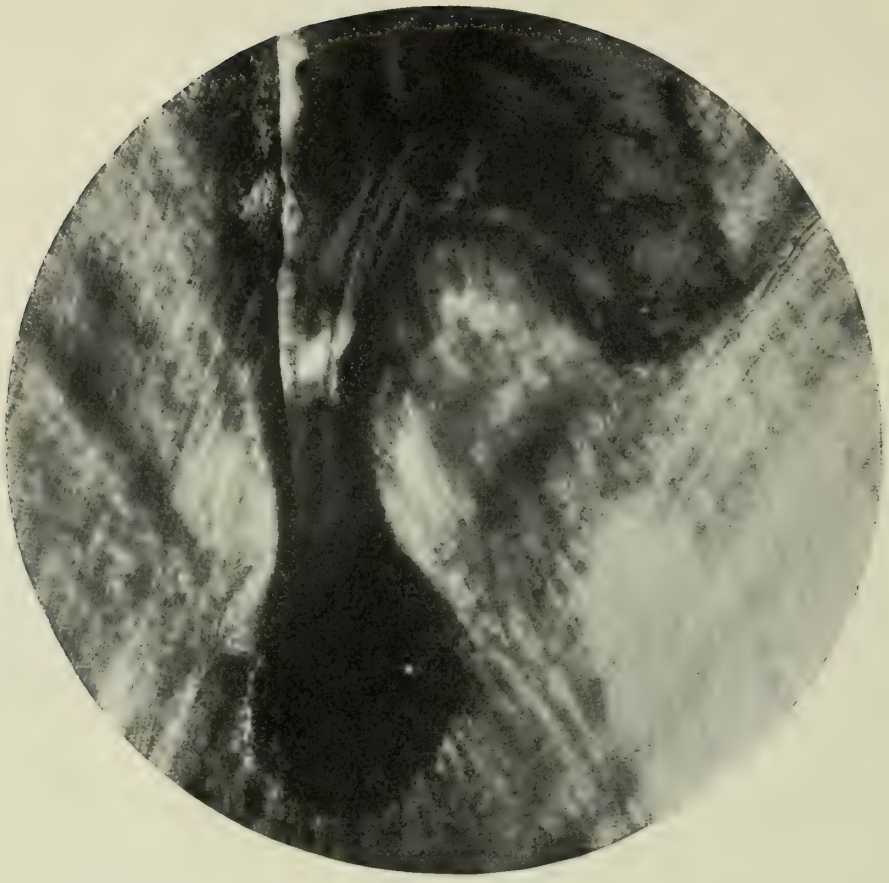
FIG. 12.



PORTION OF FIG. 11, MAGNIFIED 500 DIAMETERS

truths of physiology. By virtue of what process, I have always been asking with reference to this matter, is enamel produced? If we could force a mass of lime-salts into porous, imperfect enamel, would this mass of lime-salts possess any power of organizing itself into enamel? Is not an organizing, formative tissue necessary for producing the molecular structure of enamel? Has any one any reason for supposing that the odontoblasts possess any power for constructing enamel? If they have no such function, and as the organ from which the enamel was originally formed has no exist-

FIG. 13.



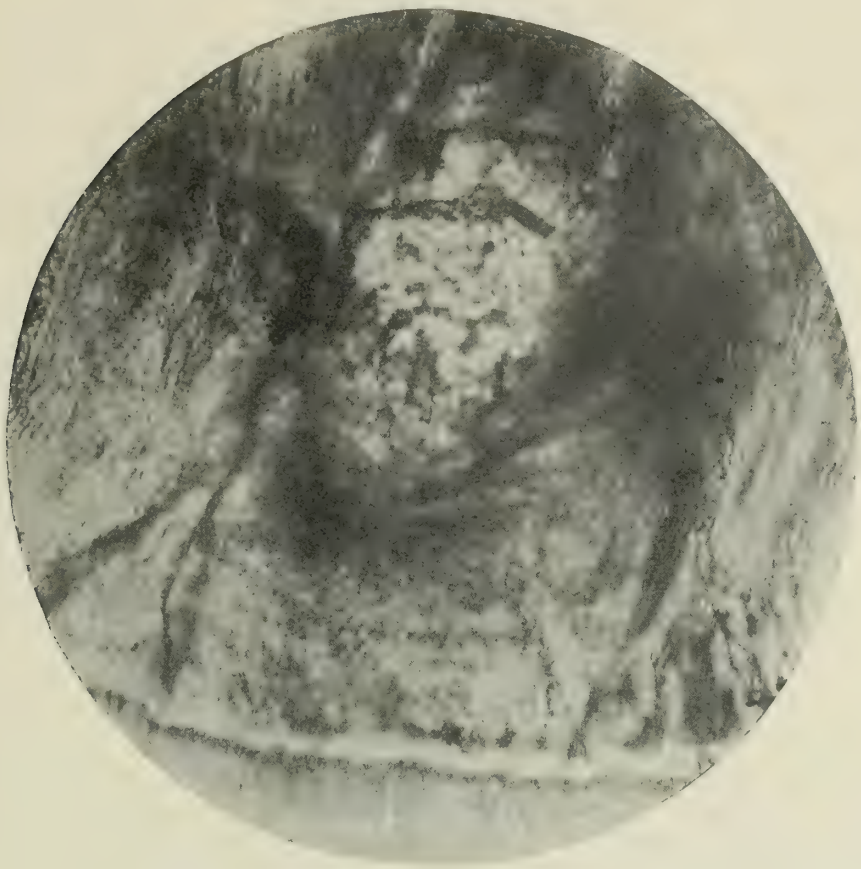
SECTION THROUGH MOLAR OF GORILLA, SHOWING APPEARANCE OF ENAMEL IN THE VICINITY OF A SULCUS. × 100.

FIG. 14.



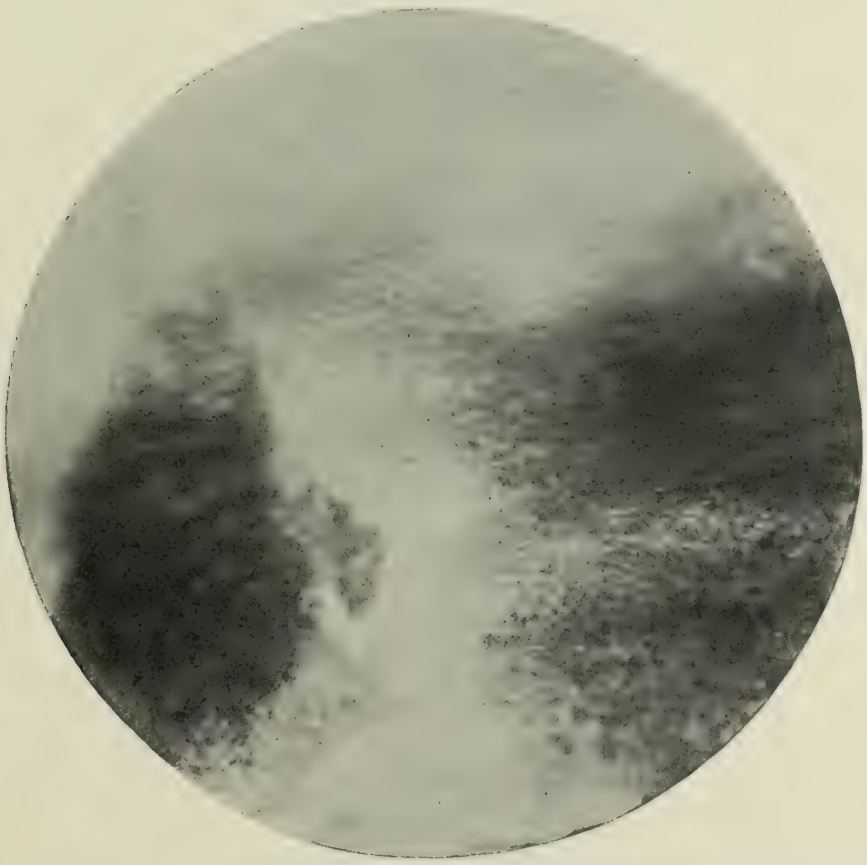
SECTION THROUGH HUMAN CUSPID, SHOWING SULCUS AND APPEARANCE OF TISSUE IN ITS VICINITY. × 75.
From a specimen in the possession of Dr. J. Choquet, of Paris.

FIG. 15.



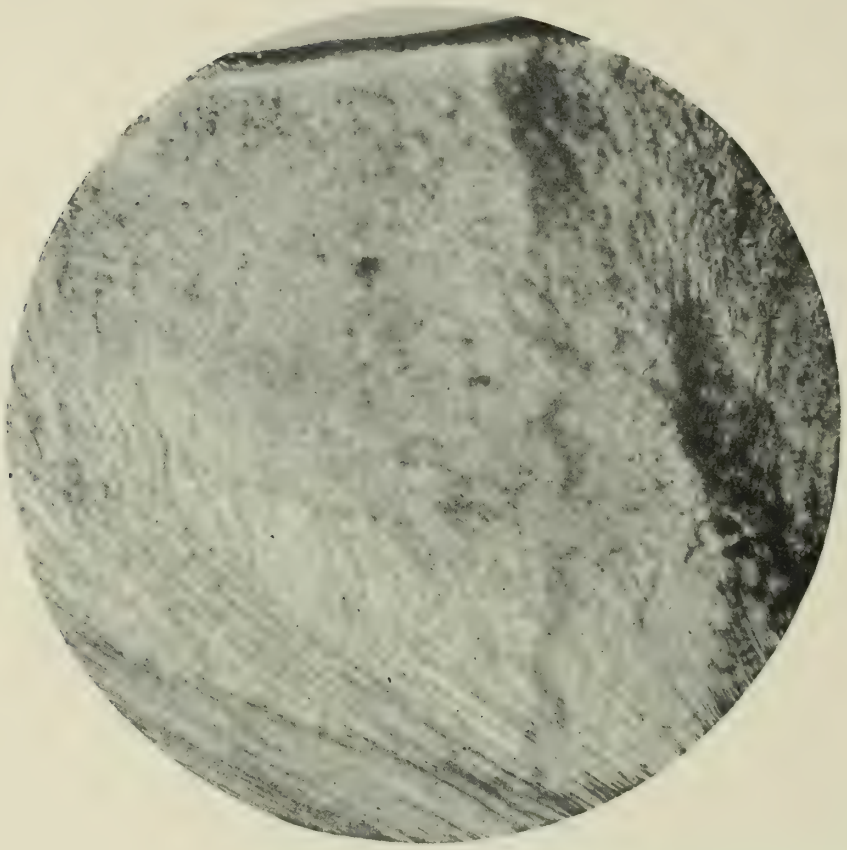
SECTION THROUGH GRINDING-SURFACE OF TOOTH OF ORANG, SHOWING TERMINATION OF SULCUS. × 300.

FIG. 16.



SECTION OF ENAMEL OF ORANG, SHOWING AMORPHOUS, COARSELY GRANULAR AND DEEPLY PIGMENTED MASSES OF TISSUE. × 300.

FIG. 17.



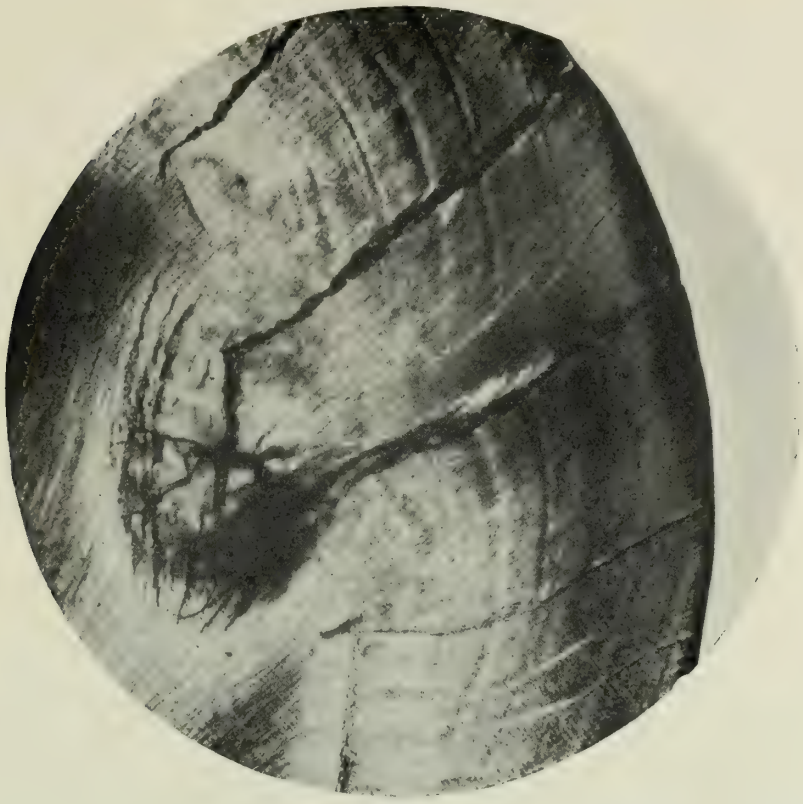
SECTION THROUGH TOOTH OF SYRIAN HYRAX, SHOWING VERY IMPERFECT CALCIFICATION OF ENAMEL. × 250.

FIG. 18.



SECTION OF MOLAR OF AFRICAN PORCUPINE (*Hystrix cristata*). × 4.

FIG. 19.



SECTION OF HUMAN BICUSPID, SHOWING MASS OF VERY IMPERFECTLY CALCIFIED ENAMEL PROJECTED INTO THE DENTIN, WITH COARSE FISSURES LEADING TO THE SURFACE. × 75.

FIG. 20.



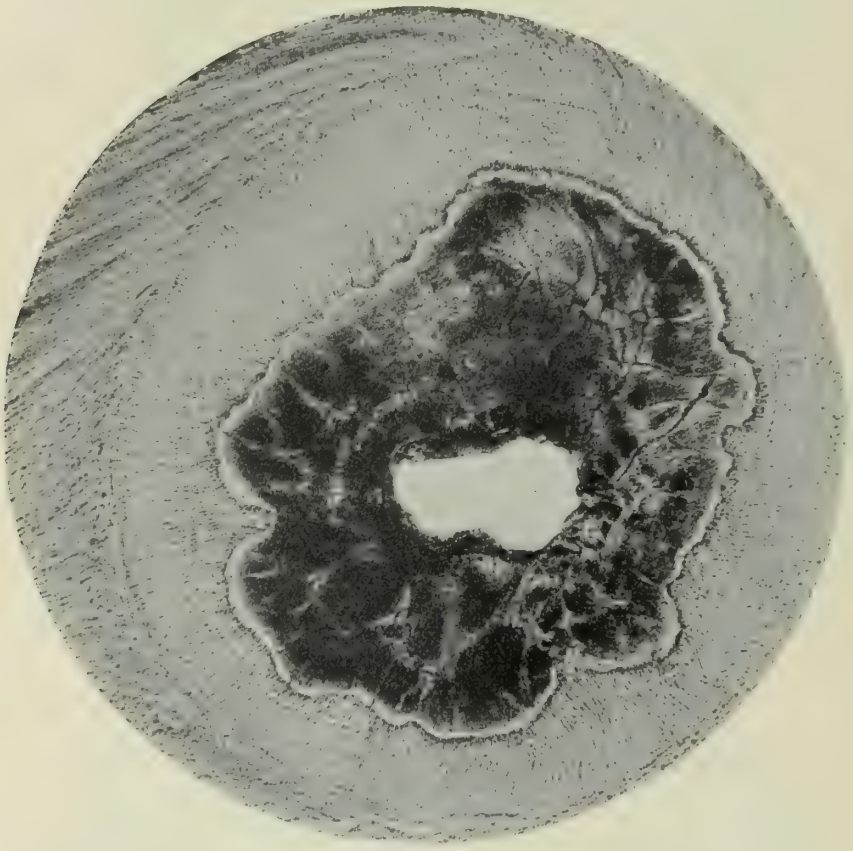
FROM SECTION OF TOOTH OF CHIMPANZEE. × 75.
A more marked type of the same imperfection shown in the preceding illustration.

ence after the completion of enamel formation, on what fact is based this notion of a fluctuation from a physiological to a pathological condition, and *vice versa*, in this tissue? Surely, the advocates of this theory should meet these points fairly and squarely or abandon what, on its face, seems a most absurd and fallacious conjecture.

The uniqueness of enamel as an animal tissue should always be kept in mind in applying to it terms which are used to designate structural or functional conditions of other tissues of the body.

The term pathology, for instance, is used to signify morbid physiological and anatomical conditions of animal tissues. It expresses a departure from normality in function or structure. Per-

FIG. 21.



FROM TRANSVERSE SECTION OF ROOT OF HUMAN MOLAR. ×75.
Specimen sent me by Mr. S. P. Cowardin, of Virginia.

version of function must precede imperfections or abnormalities of structure, although the connection between these two conditions is often indirect and the relation more or less remote. Now, there is no evidence to show that any functional or physiological change ever occurs in completely calcified enamel. Such imperfections of structure, therefore, except caries, as may be found in this tissue must be wholly attributed to perverted nutritional conditions or to functional disturbances of the enamel-forming organ during the developmental period. All changes taking place in *fully formed enamel* must be the result of some agent acting from without, and against the action of any external destructive agent this tissue has no greater power of reaction than has sugar or salt of reacting

against the water in which they are dissolving. With these facts in mind I can see no reason why the term pathology should not be applied to all structural departures from normality in enamel, whether induced during the developmental period or brought about by caries after the formative processes are completed.

It should always be understood, I think, that the significance of all scientific terms must, in the nature of things, be more or less elastic. Every new truth discovered in any department of science must necessarily enlarge or modify the meaning of such terms as have been used in the particular field in which the discoveries occur.

FIG. 22.



FROM SECTION OF HUMAN INCISOR. × 125.
Showing "bands of Retzius" and marked stratification of enamel.

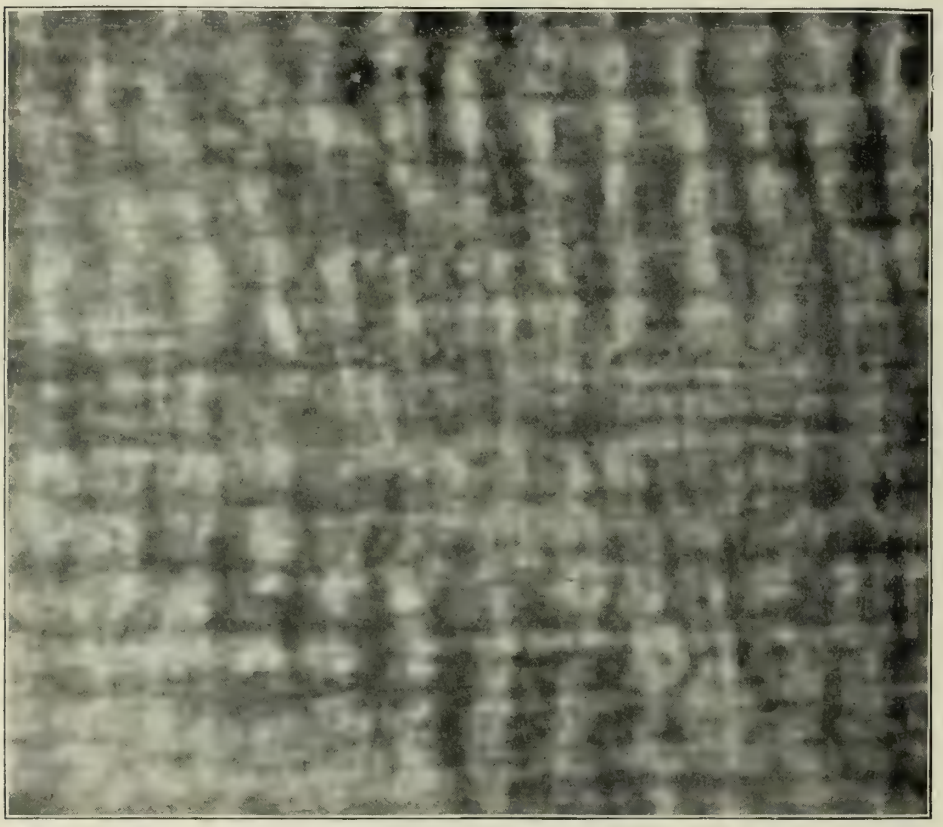
In my recent series of papers in the DENTAL COSMOS on "The Formation and Structure of Enamel," several new facts were brought out on this subject. As these new facts have a direct and important bearing upon the processes of decay in this tissue, as well as upon all departures from normality in its structure, I am sure you will not object to a brief reminder upon these points by a glance at a few photographs preparatory to a consideration of the subject proper of my paper.* With these pictures of the formation and the structure of completely formed normal enamel freshly in

*At this point several photographs from the series of papers on the Formation and Structure of Dental Enamel were thrown on the screen.

your minds, we will now proceed to the study of such departures from normality in the structure of this tissue as I have to exhibit.

In Figs. 1, 2, and 3 is seen at a glance almost every phase of what has been often described as pathological enamel, as it appears under low and medium magnifying power. The first of these illustrations shows the usual imperfect calcification about the sulci of a lower molar. This is a typical case of the average of these teeth as we see them in the mouths of our patients. It is neither better nor worse than many teeth which decay at these points or than many others which do not. I do not think the carious process had really commenced in this tooth. But in balsam-mounted specimens, where the real cause of decay is nearly always removed, it is

FIG. 23.

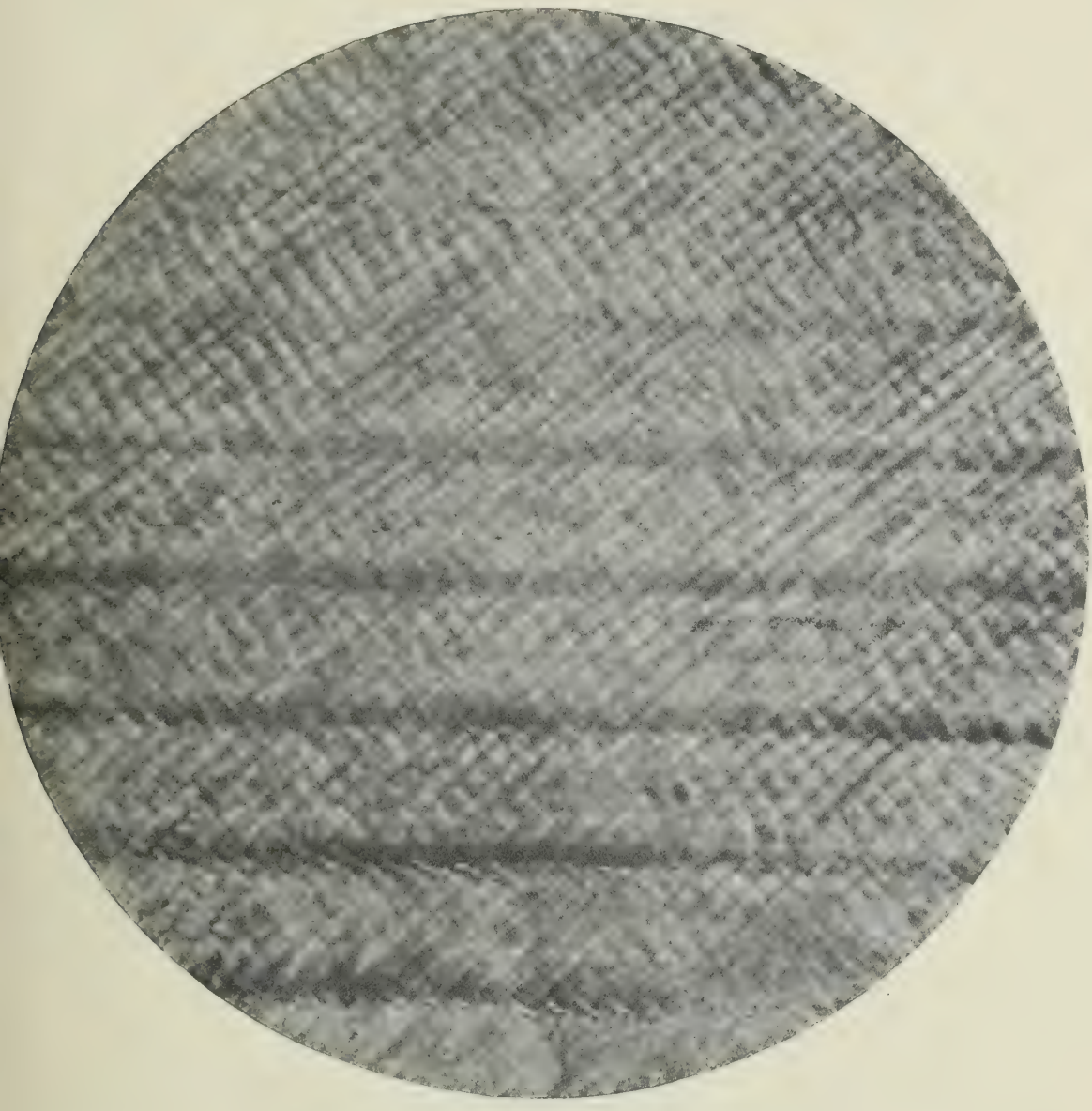


FROM A PORTION OF THE PRECEDING ILLUSTRATION. × 1500.

often very difficult to distinguish between caries and a certain phase of imperfectly calcified tissue. Aside from these coarser imperfections the enamel is somewhat pigmented and granular on the outer ends of the rods, and spaces and clefts appear near the line of junction with the dentin. Fig. 2, also from a section of a lower molar, shows a very different type of imperfect enamel. The pits and grooves in the grinding-surface of the enamel are less marked than in Fig. 1, but the finer structure of the enamel shows a much greater departure from normality. On the left side of this illustration is shown a so-called "white spot" in section. These spots, although appearing white by reflected light, are always dark by transmitted light. They are often surrounded by a light zone, as in this instance, precisely the same in appearance as that surround-

ing the dark tissue in caries of enamel.* Very light and deeply pigmented patches of enamel alternate irregularly throughout the entire structure. In some of the deeply pigmented places the enamel is coarsely granular, while in other spots it is normal in this respect. Let us examine portions of this specimen under higher power. Fig. 3 is from the edge of the white spot just where it passes over into the light zone which everywhere surrounds it. It should be remarked for the benefit of those not familiar with micro-

FIG. 24.



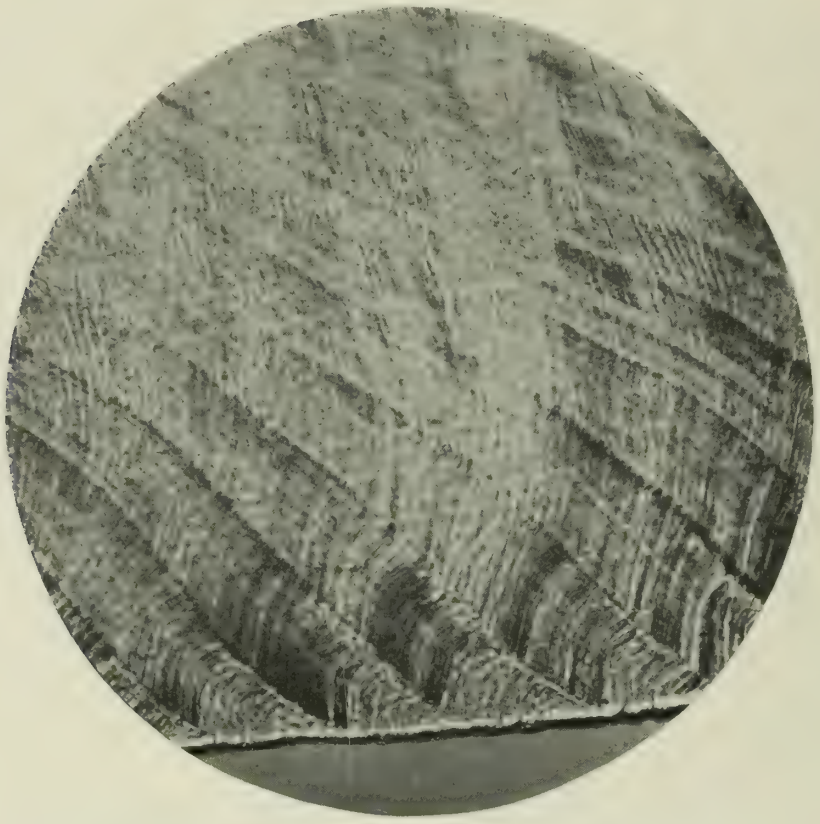
FROM SECTION OF HUMAN ENAMEL. × 500.
Showing how the appearance of ground-off ends of the enamel-rods may be produced by grinding the section at a certain angle.

scopic work that the sharp contrast in light and shade seen under low powers becomes less and less as we increase the magnification. The larger half on the right side of the illustration is from the dark part of the "white spot," while the left side shows the edge of the lighter zone. We observe that the enamel in the "white spot" is

*The light and dark zones seen in decaying enamel are not so constant or are more irregular in their arrangement than in the structure known as "white spots."

not only more granular and more deeply pigmented, but also that the enamel-globules of the rods have not melted together as completely as in the lighter part. Now, it is quite possible that a large part of these appearances of color and granularity is due to a deficiency of that albumen-like product of the enamel-organ which constitutes, when calcified, the cement-substance of enamel. This substance, as I have already pointed out, not only unites the rods, but also the globular bodies of which the rods are built up, and one effect of its presence is to make the enamel-structure more transparent and to conceal or make obscure both structure and color. Its absence, whether from deficiency of material during the formative period or in instances where it has been partially re-

FIG. 25.

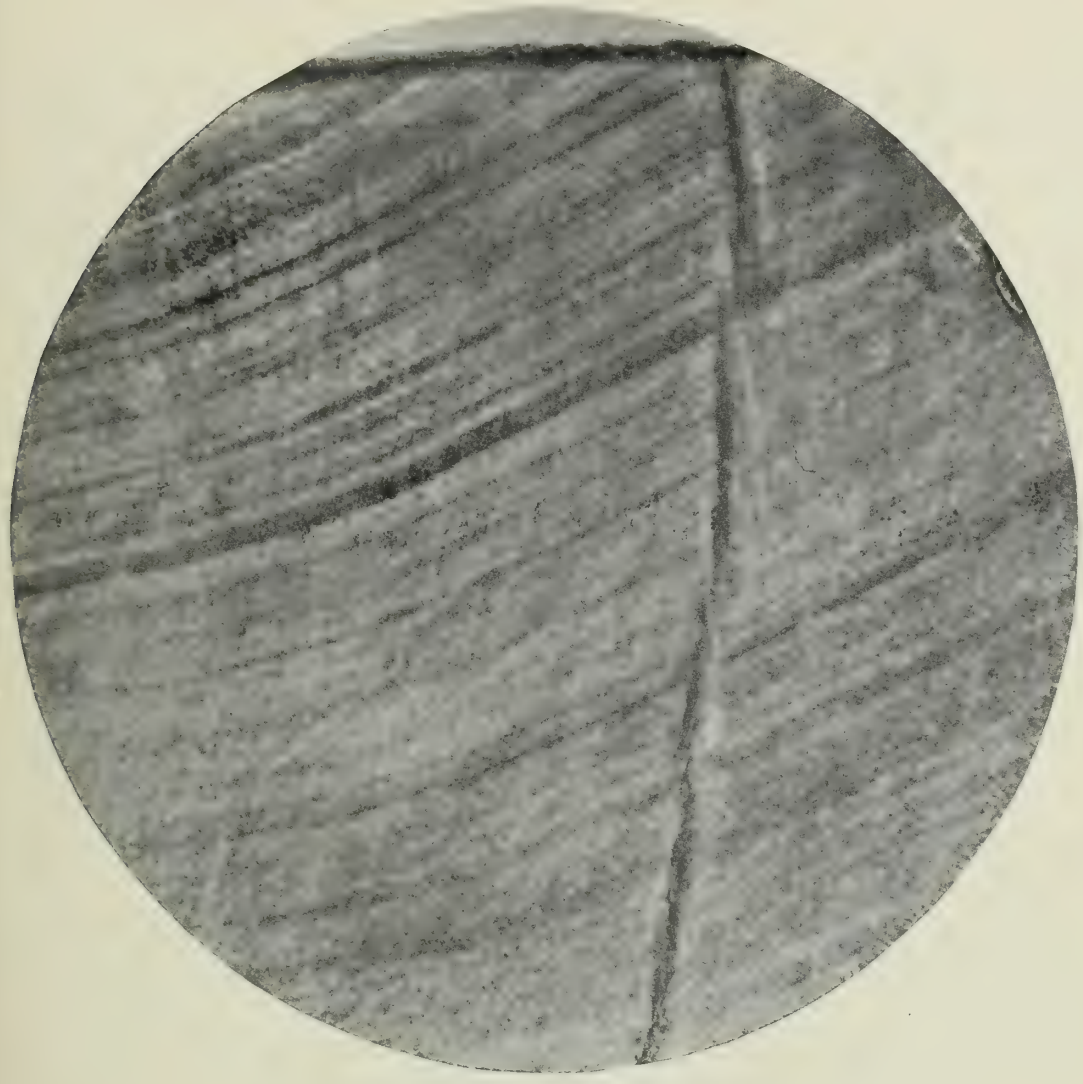


FROM SECTION OF ENAMEL FROM TOOTH OF CHIMPANZEE. × 300.
Showing deflection of enamel-rods at lines of stratification.

moved at the commencement of the carious process, renders the real structure of enamel more apparent, and by causing a breaking in the rays of light produces the effect of color. The finest formed enamel is always seen to be granular when its true structure is revealed. That it is sometimes difficult to distinguish by structural appearances between decaying enamel and imperfectly formed enamel is clearly seen in Figs. 4 and 5. Fig. 4 is from a portion of the right hand side of the white spot, as shown in Fig. 3, seen under a power of about two thousand diameters. It will be clearly seen that the enamel-rods and the globular bodies of which the rods are built up are very imperfectly united because of the evident deficiency in cement-substance. Fig. 5 is from enamel in the first stages of decay as seen under the same power. The general appearances are, as you see, alike in both specimens. In both there are spaces

between the rods and between the globular bodies. The appearances in the first instance are undoubtedly caused by a lack of sufficient cement-substance to completely unite the globular bodies and rods. In Fig. 5 the cement-substance has been removed by the acids producing decay until the same stage, with reference to the absence of cement-substance, has been reached as is shown in Fig. 4. The comparison is not only interesting in itself, but it is a confirmation amounting almost to absolute proof of my position as to the manner in which enamel is formed as I have previously de-

FIG. 26.



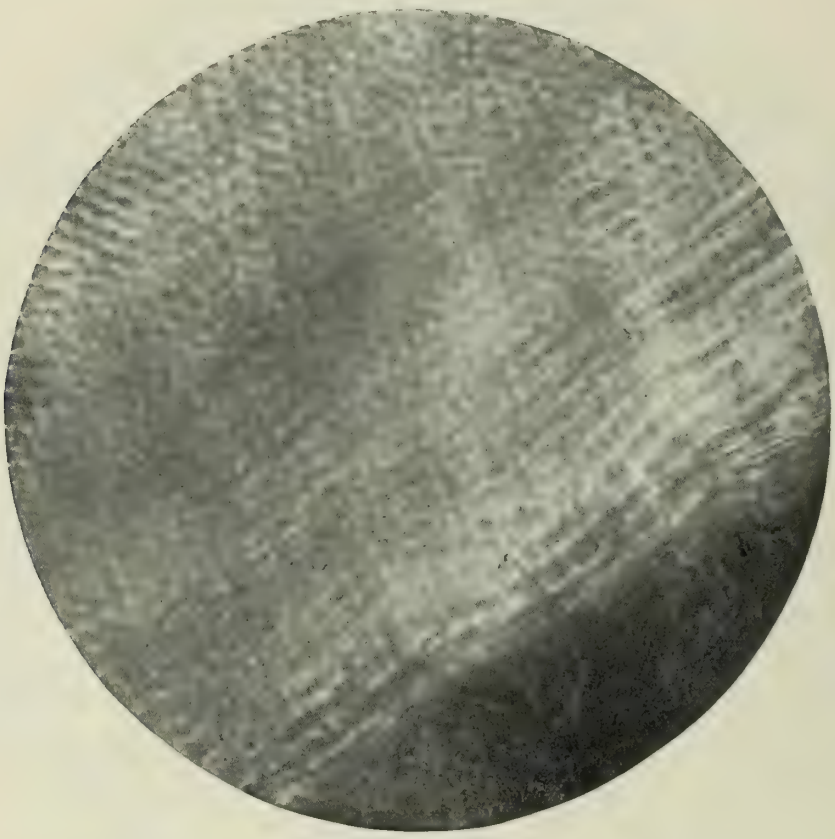
SECTION OF ENAMEL FROM TOOTH OF ORANG. × 150.
Showing very fine stratification.

scribed it. In both instances the granular and fibrous appearances of the enamel are much more marked than in the surrounding tissue. In both instances the fields from which the photographs were taken were white by reflected light and brown by transmitted light. No explanation of these appearances seems possible to me except the one which I have given, and which is based on the evidence shown of two distinct products of the enamel-forming organ.

Fig. 6 shows the condition of the enamel in the immediate vicinity of one of the sulci of the molar tooth previously exhibited, as it

appears under a power of about three hundred and fifty diameters. The tissue shows the action of acids to a considerable depth, and the pigmentation is real, that is, it is dark by both transmitted and reflected light. The acid products of bacteria often penetrate the enamel to a great depth, sometimes passing through the entire thickness of this tissue, before the external surface begins to break down. The evidence of this as shown in Fig. 7 seems conclusive. This photograph is from an unstained specimen, and it seems evident that the colored zone of dentin shown, which, to all appearances, is identical with the discoloration of ordinary decay of the dentin, was caused by acid which penetrated from the surface of

FIG. 27.



SECTION OF ENAMEL FROM TOOTH OF GORILLA. × 500.
Showing very imperfect calcification. Each layer of enamel-globules is seen to produce a line of stratification.

the tooth. The area of the affected enamel is shown by the dark boundary lines seen on either side of the field. I shall refer to this feature of caries again in the second part of my paper.

The special points which I wish to bring before you this evening in the first half of my paper are such as have grown out of a comparison of the enamel of human teeth with that of the teeth of various animals, especially some of the anthropoid apes. The significance of these comparisons will probably be more clearly seen if we group them instead of going over the entire field of human enamel first and then following with an examination of animal teeth. The latter method might bring certain similar defects of structure so far apart that their relation would be overlooked.

The various phases of enamel-structure which have heretofore been described as pathological may nearly all be arranged under

five or six headings. The coarser imperfections, such as the pits, grooves, and fissures found chiefly on the grinding-surfaces of the molars and bicuspids, are generally considered first. Then come appearances which have been described as pigmentation, granulation, striation, stratification, amorphous enamel, enamel containing organic matter, and spaces or cavities in enamel with organic matter or fluid. Some of these conditions we have just been studying. Let us now turn for a few moments to an examination of the enamel of some of the primates which stand next to man. Fig. 8 is from a perpendicular section through the grinding-surface

FIG. 28.



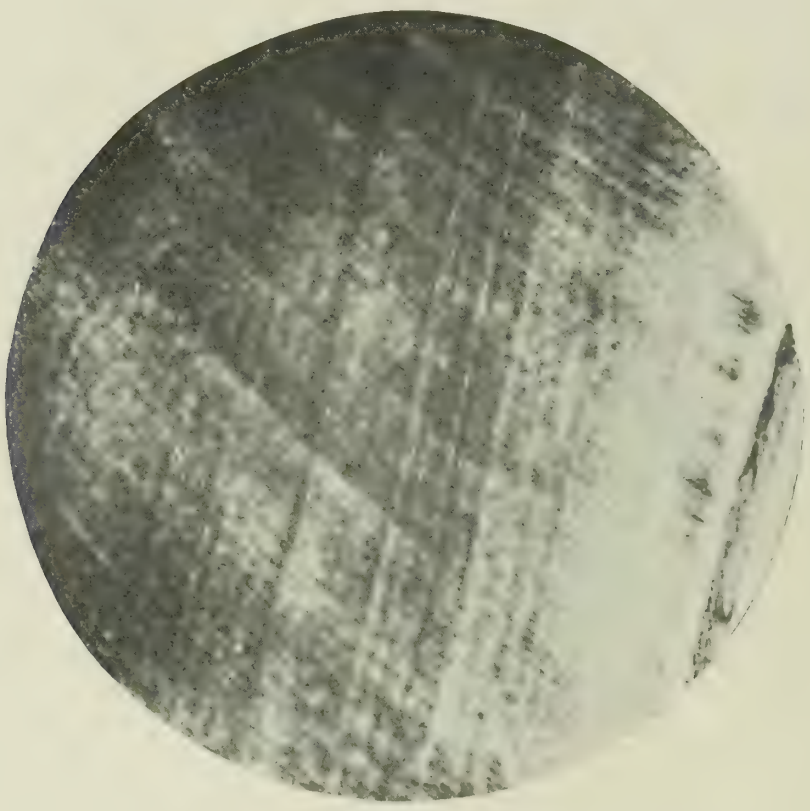
SECTION OF ENAMEL FROM FOSSIL TOOTH OF MASTODON. × 400.
Showing very marked stratification. The enamel-rods are seen to be slightly deflected at each line of stratification.

of the molar of a gorilla. The animal from which the tooth was taken was shot in his native wilds, and had therefore never been brought under the degenerating influence of modern civilization. The enamel presents almost every phase of what has been figured and described as pathological conditions of this tissue. The grooves and pits are larger and more numerous than they average in human teeth. Some of them penetrate nearly or quite to the dentin, enlarging at their lower extremities so that in cross sec-

tion they have a flask-shaped appearance, and thus seem particularly well adapted for the propagation of bacteria. Even under the low power used in making this photograph there is exhibited coarse stratification of both enamel and dentin. The enamel is also seen to be pigmented and to contain numerous fissures, while the dentin has a very marked zone of interglobular spaces. We will return to this specimen presently and examine parts of it under higher magnifying powers.

Fig. 9 shows a part of the outer cusp and grinding-surface of the molar of an orang in which you see nearly the same conditions as were shown in Fig. 2. The pits are sometimes open quite to the dentin, and sometimes they end close to that tissue in large

Fig. 29.



Section of Tooth of Manatee. × 200.
Showing coarsely granular, pigmented and stratified enamel.

globular masses of amorphous enamel. The dentinal fibrillæ penetrate the enamel and terminate in bulbous enlargements or in clefts and spaces of irregular shapes (see Fig. 10).

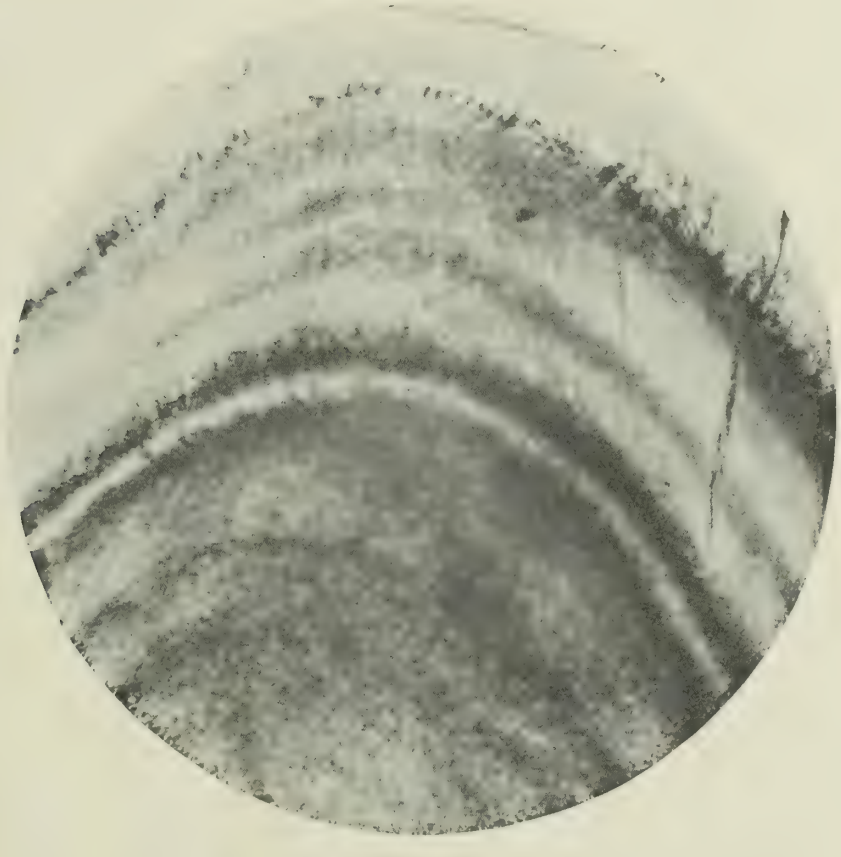
Fig. 11 is from the bicuspid of a chimpanzee, and also shows almost every phase of imperfect calcification of enamel. If we select from any of these teeth one of the spots which are opaque white by reflected light and brown by transmitted light, and examine under high power, we find precisely the same condition as was observed in the corresponding spots from a human tooth (see Fig. 14). The same marked striations of the enamel-rods, due to imperfect coalescence of the globular bodies or sections of the rods, are everywhere plainly observable. I should remark in passing, that all of the illustrations of animal teeth which I shall show this

evening are from such as have been killed in their native wild state.

If we examine one of the sulci in the tooth of the gorilla previously described under a power of two hundred diameters (Fig. 13), we shall see the flask-shaped termination of the pits to which I referred. The sulcus is quite open nearly to the bottom, and the extreme lower part is filled with some deeply stained substance, possibly the remains of food material. Lines of stratification are very pronounced in places, and the globular bodies are almost completely isolated from each other.

Fig. 14, photographed from a section of a cuspid tooth sent me by Dr. Choquet, of Paris, shows an imperfectly calcified tract of

FIG. 30.



SECTION OF CUSP OF HUMAN MOLAR. × 125.
Showing stratification of enamel of an entirely different type from the foregoing illustrations.

enamel leading from the surface to a large sphere-shaped cavity lying near the dentin and partly filled with an amorphous mass of tissue.

Fig. 15 shows a similar formation from the tooth of an orang. I have rarely seen more imperfectly formed enamel than this in any human tooth. Other spots are found throughout the substance of the enamel of these teeth where the normal arrangement of the rods is completely broken up by a coarsely granular, deeply pigmented deposit (see Fig. 16). In grinding, the enamel seems to offer much less resistance to the wheel than the average human tooth.

In sections from the teeth of the Syrian hyrax I have sometimes

observed the entire thickness of the enamel to be composed of this coarsely granular, amorphous tissue filled with irregular spaces, and more or less penetrated by the dentinal fibrillæ (see Fig. 17).

In some of the Ungulates, Marsupials, and Rodents one often sees teeth where the infoldings of dentin, enamel, and cementum are very imperfectly united. Fig. 18 is a photograph, under very low power, from the molar tooth of an African porcupine (*Hystrix cristata*). The tooth was very much worn, and from the grinding-surface deep, wide fissures penetrated more than half the length of the entire tooth. It is perfectly safe to say that if these teeth were placed in such an environment as may be found in a human mouth where the teeth are decaying, they would rapidly disappear from caries. But I have never yet seen a decayed porcupine tooth.

Fig. 19 shows another very marked type of imperfect enamel sometimes found in human teeth. This section was ground from the outer cusp of an upper bicuspid, and shows wide fissures leading from the surface through the entire thickness of the enamel to a large mass of imperfectly calcified tissue which is projected into the dentin. Fig. 20 shows a more pronounced form of the same type of imperfection from the tooth of a chimpanzee. The clefts and spaces are larger and more numerous than in the human tooth, and the general quality of the surrounding enamel is not so good.

When I began this investigation I had no thought of finding the exact types of the imperfections of human teeth duplicated in the teeth of animals. These duplications came gradually and incidentally as I proceeded with my work.

Fig. 21 shows a curious freak in the formation of a human tooth which I have never seen duplicated. So far as I am aware it is quite unique. The photograph is from a transverse section of a root of a human molar, and shows well-marked although imperfect enamel lining the pulp-canal. I know nothing of the history of the tooth, which was sent to me by Mr. S. P. Cowardin, of Virginia.

A considerable proportion of abnormalities in human teeth have always been attributed to certain exanthematous diseases peculiar to childhood, but I have never heard it suggested that infant gorillas or youthful chimpanzees were liable to attacks of measles, chicken-pox, or scarlet fever, and so the many imperfections which I have discovered in the enamel of their teeth came as a great surprise to me.

The descriptions of striation and stratification have formed an important feature of most works on pathology of the enamel.

Dr. Frank Abbott, whose contributions on this subject are more voluminous than those of any other writer, says,—

"Under the foregoing headings I have described a number of pathological conditions of the enamel, which, at least so far as stratification, pigmentation, and granulation are concerned, mean a deficient formation of the basis-substance, together with a decreased deposition of lime-salts. These conditions are, in my judgment, of the utmost importance in the etiology of caries. Ail-

ments either of the mother during gestation or of the infant in the earliest periods of life obviously cause such anomalies in this tissue."

The facts all tend to show that this is erroneous speculation growing out of insufficient or imperfect observation. So far as pigmentation and granulation are concerned, I have shown that they are frequently found in the teeth of animals. Granulation, especially, is more frequently found in enamel from the teeth of monkeys than in human teeth.

I have already shown that striation is simply a record of the method of formation of the individual enamel-rods. Stratification represents a developmental fluctuation of the formative process of enamel considered as a whole. The so-called "brown bands of Retzius" is a phase of this formative fluctuation. In the most typical aspect of stratification the lines pass between each layer of the globular bodies of the enamel-rods as they are deposited, in this respect corresponding exactly with lines of striation.

Fig. 22 shows a characteristic view of stratification from the labial surface of a central incisor at a point about two-thirds of the distance from the cutting-edge to the gum margin. Up to the time of the removal of this tooth, which was extracted because of extreme looseness, the mouth from which it was taken contained an unbroken set of teeth with but very little decay. The patient was fifty-five years of age. If stratification be regarded as an evidence of departure from the normal density of the tooth, then here again is a confirmation of Dr. Black's position that teeth attacked by phagedenic pericementitis are not more dense than those which are attacked by caries. But I think this phase of stratification can hardly be regarded as pathological, for reasons which will be evident presently. Fig. 23 shows a portion of the foregoing under a power of fifteen hundred diameters. The abrupt contrasts of the lines or bands which we observed in the photograph made under a low power have disappeared, and their position is only faintly seen. The enamel-rods are observed to pass through these bands without break in their continuity. In passing from one band to another the enamel-rods are sometimes deflected from their usual course. Such specimens, if ground at a certain angle, would show the rods of each band cut off at the point where the deflection occurs. This is clearly shown in Figs. 24, 25. This deflection or bending of the rods is strikingly illustrated in Fig. 25, a photograph from the bicuspid of a chimpanzee. The general structure of the enamel in this specimen is seen to be a greater departure from what is generally regarded as the normal standard than that shown in the human tooth previously exhibited. In my papers on the formation of enamel I said that the enamel-globules are deposited simultaneously over the entire surface of a forming tooth. This statement is confirmed by the appearances shown in Fig. 26, from the tooth of an orang, where also the incremental lines are seen to be identical with the lines of stratification. Each layer of enamel-globules forms a single line. During the development of this tooth some physiological change must have occurred at different periods

which led to an increased pigmentation of certain of these layers. In one place four or five successive layers are pigmented, while on either side of this colored band are other bands much lighter than the surrounding tissue. There is no evidence that this sort of pigmentation weakens the enamel-tissue or makes it less resistant to the action of acids. Stratification of the kind shown in this illustration is entirely due to pigmentation of certain layers of enamel-globules (Fig. 29). Various peculiarities in the formation of enamel are seen to correspond with these successive layers, as exhibited in Figs. 27 and 28, the former representing enamel from the tooth of a gorilla and the latter from the fossil tooth of a mastodon. In both of these, as also in Fig. 29, which shows a deeply pigmented and coarsely granular enamel from the manatee, the lines of stratification are seen to be caused by unusually well-marked layers of deposit. The specially emphasized lines might be caused by a slight movement of the enamel-forming cells on the surface of the forming enamel. This would also explain the slight change in direction of the enamel-rods which may often be seen at these points.

Another much rarer, and totally different kind of stratification is shown in Fig. 30. Here the lines or bands are manifestly due to some violent or especially marked disturbance of nutrition. They are not formed by the orderly deposit of enamel-globules as in the preceding illustration; on the contrary, they are due to a complete breaking up of that orderly process. Here instead of regularly formed, even bands of calcified globular bodies, we have irregularly shaped spaces. This is the one case in ten thousand of which I have spoken, and it is upon these very exceptional cases that Dr. Abbott generalizes when he says that such spaces appear invariably in stratified enamel. I have shown a considerable number of specimens of stratification of various kinds in which no spaces appear; in fact, during studies of this subject which have extended over more than twenty years, I have not seen more than a dozen specimens of stratification like the one shown in Fig. 30. I have never found defects as marked as appear here in enamel from the teeth of any animal.

(To be continued.)

Children's Teeth as Indicators of Disturbed Nutrition.

BY S. HENRY DESSAU, M.D.,

Professor of Pediatrics, New York School of Clinical Medicine.

(Read before the First District Dental Society of the State of New York, November 10, 1896.)

There is too frequently a decided tendency for the specialist in medicine to overlook the great importance of underlying causes or influences of constitution in disease. The rapid advance that has occurred in medicine of late years has made it almost impossible for one individual or set of individuals to master the entire subject; hence we should be only too willing to learn from

each other. Teeth are living organisms, and, like other structures in the animal body, are subject to disease. Now the main object of dentistry being to repair and save teeth, there is, I take it, a natural tendency to lean toward the side of mechanics in the pursuit of its practice.

Hence, having accepted the kind invitation of your committee to present a paper before your society, I thought it would be to our mutual interest to discuss, from the standpoint of the general practitioner of medicine, the subject of disturbed nutrition of the animal body as it affects the teeth in children. The general practitioner of medicine is ever on the alert for all signs or symptoms that may aid him in the better recognition of certain diseased conditions of the human body. In this regard the condition of the teeth has not been neglected. On the contrary, they have become an important subject of study, especially in relation to diseases of children. It is right here that dentistry and general medicine may advantageously co-operate to further a better knowledge of odontology, and so endeavor, perhaps, to secure sound teeth to future generations, independently of mechanical measures. I say this in all candor, for as the higher aim of medicine as a liberal profession is to know how to prevent disease, there is no reason why its special branches should not participate toward the same glorious end.

There are many forms of disturbed nutrition in young children where we find the teeth influenced the same as other parts of the body. Such, for example, are rickets, syphilis, diabetes, and the gouty diathesis, manifested in children as chronic intestinal indigestion. There is also a form of cretinism or idiocy, commonly called backward development, which in a large number of instances is of rachitic origin. Of all these mentioned, rickets may be taken as the most familiar illustration of disturbed nutrition affecting the teeth, and may therefore easily become the text of our discussion.

Having had a large experience in observing the diseases of children, the influence of rachitis upon the growth and decay of the teeth has interested me greatly. Rickets is commonly regarded as a diseased manifestation of faulty nutrition. By this term much more is implied than a mere insufficiency of proper quality of food. Nutrition in its broader sense means food suitable to the physiological requirements of the age and condition of the individual. For example, Trousseau, the great French physician, claimed that he had produced rickets in young puppies and pigs by feeding them upon raw beef, a food wholly unsuited to their age, though, as we all know, dogs are carnivorous and hogs omnivorous animals. The mother's milk of a standard quality is the natural food of infants, but if they are fed on starchy food or a poor quality of milk, or given too much sugar or meat, they may easily become subjects of rickets. But nutrition has an equally important meaning in the proper assimilation of food. Fothergill said that above every nursery door should be written, "It is not what is swallowed, but is assimilated, that nourishes." By assimilation we mean the final and complete conversion of the food into its various

elements by the animal organism, and the appropriation of these elements by the various tissue-cells to form new growth. The medium of its performance is through the blood, which receives in exchange those elements called waste matter that have already performed their part in the nourishment of the cell. It will at once be inferred that assimilation depends largely upon something more than gastric and intestinal digestion.

It is true that we find in the vast majority of cases of rickets infants who are fed on artificial foods, containing chiefly starches, or milk with a small percentage of fat and a large percentage of casein. Such foods do in time undoubtedly derange infantile gastric digestion. But, on the other hand, we see cases of rickets in infants who are breast-fed, the mother's milk being of good average quality, with every reason to believe that it is well digested, so far as the stomach is concerned. Then again, there are rare cases of pre-natal rickets. Hence we infer that assimilation, for its perfect performance, involves complete oxidation in the tissues of the various elements of nutrition in the food, and this requires a free supply of oxygen to the blood in the form of pure air. It has been well said that rickets appears to be one of the penalties of civilization. It is certainly more commonly seen in large cities where breathing space is limited, and is rare or unknown among savage tribes or those people who live an out-door life. In this connection, it is interesting to note that rickets is extremely rare in the full-blooded African race as seen in this country, while in the mulatto or hybrid African it is quite common.

Besides proper food and its complete assimilation, nutrition requires as a factor the influence of sunlight, which in some unknown way, probably through furnishing heat, bestows vital energy to the tissues. The growing infant requires an amount of heat which it is unable to generate through its own muscular exercise, and therefore clothing properly adapted to the climate and season are necessary for its due maintenance. As will be shown later on, fats, which are known as respiratory or calorifacient food, aid in maintaining the body heat, and are highly beneficial in correcting the condition producing rickets.

Although rickets is called a disease of malnutrition, it does not necessarily cause wasting of the soft tissues of the body, though in fact these do become flabby, while at the same time the color of the skin becomes pale from a deficiency of the hemoglobin of the blood. This may possibly be explained by the gradual manner of development of the trouble, for in cases of acute malnutrition in infants, where the digestive functions are principally deranged, there is diarrhea, followed by extreme wasting, commonly called marasmus, which condition does not present any of the phenomena of rickets. One other point in relation to the disturbance of nutrition as being at the foundation of rickets is the effect of the mother's condition of health during pregnancy upon the future child. The opinion has been advanced that a condition of anemia or poor quality of blood in the mother will so affect the developing embryo that after birth it will be readily disposed to manifest

rickets from the slightest causes. In the light of such a theory, we must also admit heredity as a cause.

Having regarded rickets as a disease of faulty nutrition, it will now be interesting to consider its pathological features. The most noticeable lesions are observed in the bones and teeth, but the muscles, nerves, skin, and in fact all the tissues of the body, may become involved. The old idea which prevailed in medicine ascribed the deformity of the spinal column, which commonly occurs in an early stage of rickets and is a prominent feature, to softening of the vertebral bones. Hence the origin of the name rachitis, from *rachis*, the spine. We now know, however, that this deformity proceeds from muscular weakness only; nevertheless, there does occur in the course of the disease softening of the bones, from which, as a result of pressure applied in various directions, arise deformities. This softening of the bones is due to a deficient deposit of lime-salts in the process of ossification, and not to any subsequent absorption of these salts. The present view in regard to the pathology of the disease, as stated by Dr. Barlow, of London, who is perhaps one of the highest authorities on the subject, is that there is an inordinate production of immature osteoblasts or bone-cells at the seat of growth of the bones. These crowd upon one another in such a rapid manner that there is not only incomplete ossification taking place, but in some parts of the growth premature ossification as well. This pathological feature leads to the belief that the young bone-cells are overstimulated in growth by some element in the blood acting as an irritant to the nutrition of the bone-cell. One theory attributes this irritant substance to lactic acid; exactly what it is we do not as yet know. Recent advances made in the study of the blood may possibly tend to throw much light on this point, and it may yet be found that hemogenesis is an all-important factor in the etiology of rickets.

The overgrowth of imperfect bone-cells is most markedly shown near the ends of the long bones at their point of growth known as the epiphyses, occurring as swellings which may be easily recognized. In the bones of the skull the openings, as a rule, close late, but may also close too early, and there are sometimes found soft spots in the occipital region along the line of the sutures.

Next to the lesions of the osseous system, the teeth in their development and subsequent condition present the most noticeable feature of rickets. The temporary teeth are late in development, and the intervals between the appearance of the various groups are longer and more irregular than the normal average. So characteristic is this feature that I have come to be suspicious of the existence of rickets in any infant who has reached the first year of life without showing a tooth. I am fully aware that in holding this view I am at variance with other good and competent observers, but so far as my memory serves me, a close investigation has always confirmed my suspicions. It may be interesting at this point to call attention to the observations made by Dr. A. Brothers, of this city, in an analysis of over 500 cases in infants

where the various stages of dentition were recorded, that in those infants affected with marasmus or acute malnutrition from digestive causes only, out of eight cases observed the first tooth appeared at an average of five months, the further progress of eruption, however, being somewhat delayed. I mention this as showing a further contrast of marasmus with rickets, even upon the development of the teeth. (The cross growth of teeth, or their irregular position in the alveolar cavity, has likewise been attributed to rickets.)

The most interesting feature, however, regarding the teeth in rickets is one that concerns the dentist more than the general practitioner of medicine. I refer to the tendency to early decay of the temporary teeth, and less frequently the permanent teeth. This decay I have often observed occurring in the central incisors even before the eruption of later groups. It was in several instances manifested as a distinct notch in the crown of one or both upper central incisors. In older children many teeth may be frequently found decaying rapidly at one time, as if they had crumbled away. The notched appearance of the upper central incisors occurring in the temporary teeth should not be confused with the same condition occurring in the permanent teeth. It is the latter that is known as the Hutchinson tooth, and is a stigma of inherited syphilis.

The reserve sac from which the permanent tooth develops is in embryonic formation continuous with the tooth-sac from which the temporary tooth grows, and being under identical influences of nutrition as the latter, no doubt becomes similarly affected in rickets. But as a rule the active process of the disease ceases at a period of time long before the normal advent of the permanent teeth, hence there is no disease process to interfere with their regular appearance; but it seems to me there can be no question that their healthy nutrition has suffered in the early days of their growth in the same manner as the temporary teeth, and this is liable to be manifested at a later period.

The fact that the most manifest signs of rachitis are furnished by the bones and teeth naturally brings up the question as to the relation the nutrition and growth of these structures bear toward each other. It would seem that not only from a clinical standpoint, but also from the scientific investigations of such eminent authorities as Tomes, Barker, and Cushing, there is a close analogy in the histological structure of bone and the cementum of the tooth. Flower states that the cementum contains lacunæ, canaliculi, and in some animals with large teeth, Haversian canals, which structure is identical to that of osseous tissue. Such being the case, the conclusion might easily be drawn that as it is definitely known the bones are ultimately affected in rickets by a deficient deposit of lime-salts, the early decay of the teeth is primarily due to the same cause. Cushing says that the teeth retain the character given them at the time of formation, and that a lack of due proportion of certain elements of dental structure permits of the easier action of outside influences, such as germs

for example. Tomes and Barker, on the other hand, state that the early decay of the teeth is not due to deficiency of lime-salts. Here is a direct conflict of opinion that can only be determined by further investigation. According to Pedley, in his work on Diseases of Children's Teeth, the *density* of dental structure is dependent upon the lime-salts deposited in the process of development. The lime-salts, in teeth of inferior density, as in rickets, for example, may be easily dissolved out by the action of weak acids derived from the fermentation of food in the mouth through the action of germs. The lactic acid produced by such fermentation combines with the lime-salts set free, and thus the organisms remain unaffected. The action is first upon the enamel, and so soon as the process of decalcification has brought the dentin within range the bacteria are able to travel along the dentinal tubules and so extend the destructive action. In the consideration of this question the fact should not be overlooked that other tissues of the body are affected in rickets besides the osseous and dental. The glandular organs, as the liver and spleen and the muscles, share in the general disturbance of nutrition, which has the undoubted effect of lowering the vitality or power of vital resistance of the entire organism to the action of outside influences, such as microbes.

Whatever the true solution of the question may be, we may rightly regard the condition of early decay of the teeth, either temporary or permanent, as one of faulty nutrition, and this should receive the attention of the specialist as well as the general practitioner. To be well informed on this point is to have at hand a remedy, for fortunately the condition of rickets is amenable to correction and cure. The health of the pregnant mother should be kept at the highest point, by careful regard and attention to out-door exercise and the maintenance of all the physiological functions. Added to this, her diet should be of that combination to secure a maximum quality of nutrition. The infant requires fresh, pure air, and plenty of it: no sleeping in closed rooms full of stale, overheated, and over-scented air. At the same time it should be well protected by proper and sensible dress from cold and dampness. Above all, its food should be what nature has provided for it, with due regard to the mother's condition. But in the unfortunate absence of mother's milk, it should have the best substitute, which is by all odds good cow's milk, properly modified by modern methods to suit its digestion. All patent foods, each advertised as the best, should be severely rejected. They are without doubt a most prolific factor in the causation of rickets and allied complaints. Milk should be the sole article of food until the eruption of the first full group of teeth, whether mother's milk or cow's milk be used, and that exclusively; unless proper judgment is shown as to the quantity given and time allowed for the stomach to become emptied before given again, trouble in the form of digestive disturbances is sooner or later sure to follow. It is, in my opinion, of the highest importance that the infant should not be over-fed. This, in my experience,

is a most pernicious practice and the one most difficult to combat in the nursery. If we could only live on half that we do, humanity, from the cradle to the grave, would be the better, brighter, and broader for the doing of it.

Practical Cataphoresis.

BY M. W. HOLLINGSWORTH, PHILADELPHIA, PA.

The principle involved in electro-medicamental diffusion is so readily appreciated that it would seem needless, at this time, to add to the already numerous articles which have been published, were it not for the fact that many either cautious or skeptical practitioners, having little or no knowledge of electricity, are deterred from using this new boon to humanity, by the confusing array of electrical terms, symbols, and equations, and the consequent inference that much electrical knowledge is a necessity. I shall not endeavor to prove that the knowledge of certain basal principles is not essential to the highest success, but I shall try to show that busy men, who have no knowledge of amperes, volts, ohms, etc., in their various relations to electrical equations, and little time for systematic study, can with much satisfaction share in the benefits to be derived from present cataphoric methods,—yet remain in as blissful ignorance of pure theory as does the amateur photographer who has learned, empirically, the art of development, without the ability to explain one chemical reaction, or, indeed, write a single symbol. He merely relies upon assured effects, produced by combinations, the chemical reactions of which he knows little or nothing, and depends upon the efficiency of materials produced by the specialist or chemical expert. Assured of quality, he can devote more time to the study of quantity in its relation to effects of light. Dependence upon the intelligent labors of others must therefore characterize much of our effort, but since dependence must always remain a mere question of degree, it remains for us to decide what that degree shall be. The dentist who would become an expert in electrical science must sacrifice his profession largely, if not wholly, to the cause.

In contrast with the over-cautious or pessimistic individual, there probably exists, also, the over-confident, sanguine character, without necessary fundamental knowledge, whose hasty deductions lead him to conclude that a thirty per cent. solution of cocain and fifteen volts of pressure "will do the work." So he hastens to apply the cocain and the fifteen volts. But that this is not the fulfillment of required conditions the patient discovers, and both operator and patient grow pessimistic as to the "efficiency of cataphoresis." Such deduction and methods must needs result in a condemnation of the principle before the more cautious brother can become enthused with the almost unqualified success which follows the conservative method of tentative cataphoric treatment, the efficiency of which, as an aid to the dentist and relief to the

patient, remains no longer a question of doubt. Knowing that its reputation for efficiency must needs be qualified by all of many little essential details in manipulation, it is my desire to defend the cataphoric principle upon purely practical grounds, by offering such deductions from my own satisfactory experience as I believe will prove a safe guide to others, trusting that their success may encourage them toward acquiring a better understanding of those fundamental details of electrical law which should enable them to locate and remedy any defect from their electrical supply to the point of its special application. The little knowledge of essentials and electrical mechanism required to tighten a binding post might save the operator and patient much annoyance and discomfort.

For the sake of simplicity, let us begin by divesting such terms as volts, milliamperes, etc., of all theoretical significance, for which we will have no need, yet adopt them for convenience in expressing electrical quantity and force, as illustrated, by analogy, as follows:

Suppose that in your left hand you hold, at a convenient elevation, a tank containing water, and having at its bottom an outlet with a connecting rubber tube conducting the water outward,—obviously, the current or flow of water at the open end of the rubber tube will be increased or diminished as the elevation of the tank is correspondingly raised or lowered. In this case the quantity of flow, or the current, is regulated by varying the *pressure* which drives the water onward.

If, however, the tank be fixed at an elevation above the outlet of the conducting tube, the current or quantity of water flowing may still be regulated, measurably, by diminishing the opening at the outlet. In this case, the current or rate of flow is regulated by varying the *resistance* of the conducting-tube.

It will be obvious, then, that the rate of flow may be modified by either pressure or resistance, or by a combination of both methods, if desired. By analogous methods, electrical forces may also be controlled when certain causes, such as chemical affinity or magnetism, produce electrical pressure. The standard unit for measuring electrical pressure is called a volt.

In the generation of electrical pressure, should the point of high pressure (the positive pole) be joined by a conducting path to the point of low pressure (the negative pole), the resulting current will flow from the positive to the negative pole. The rate of electrical flow thus produced is measured by a standard called an "Ampere."

The path provided for the current will always offer more or less resistance to this flow, and this resistance is measured by a standard called an "Ohm."

Referring again to our analogy,—the flow of the electric current, like the flow of water from the tank, may be regulated by a variation in the pressure, by a variation in the resistance, or by a combination of both means of control.

With a constant electrical pressure, however, a variation in the rate of flow can only be obtained by varying the *resistance* in the circuit. A definite adjustable resistance for this purpose is called

a "Rheostat," which, when made and calibrated for cataphoric purposes, enables the operator to regulate and record, with approximate accuracy, the volts or fractions of a volt which may be required in practice.

While the adjustment of a rheostat may admit of positiveness, as to pressure or voltage, it affords no means of determining, accurately, the quantity of current actually flowing, for the reason that the resistance of the tooth, placed in the circuit, is unknown. The total resistance, therefore, made up in part by the resistance of a tooth, varies (with a uniform voltage or pressure) directly as tooth-material varies in resistance in different cases.

To determine this variation by mathematical methods would not only be impracticable for the dentist, but also discouraging. Therefore dependence must be placed upon an instrument devised for the purpose of directly indicating the current flow,—modified by any resistance which may be in the circuit. This instrument, the milliamperemeter, indicates in units of one-thousandth of one ampere the current actually flowing,—and it may be correctly inferred that *the ampere, as a unit, never figures in cataphoric treatment,*—indeed, the pressure required to force one-tenth of one milliampere through sensitive dentin may produce pain, particularly at the initial application.

An example of fixed pressure is adopted for the good reason that constancy in electrical supply should always be assured before essaying cataphoric treatment. This should be axiomatic, for, without *constancy,* any data obtained by experience will be of little if any value for careful tentative treatment. For constancy, greater dependence can be placed upon a battery, kept in good condition, than upon a street current, for the obvious reason that the whole supply is under control and at command all the time. It is true that there are objectionable features about a battery to offset the virtues which are, after all, so dependent upon intelligent watchful care,—but I merely desire to show what experience has proven to be essential. With a *constant* primary pressure of twenty-five volts, which in my experience has proven to be sufficient for dental purposes, a rheostat with a maximum resistance sufficient to intercept the whole electrical supply, as above expressed, and a milliamperemeter to register the current flow, let us next consider some of the needed electrodes, and then proceed to take up the operative side of the question.

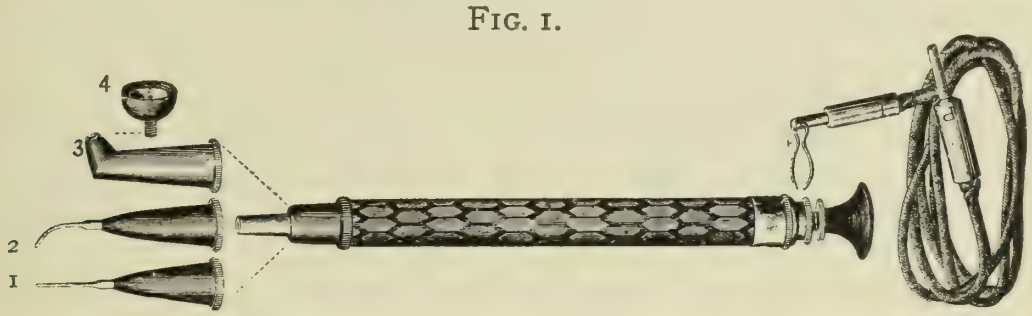
The special electrode utilized in operations of the next succeeding character is illustrated by Fig. 1.

In construction, this electrode is similar to a syringe, and is so devised as to facilitate the application of medicaments in minimum quantities where and when desired, by means of the regulated piston operating within the syringe barrel, into which the liquid has been drawn. The annoyance occasioned by excess of liquid and capillary attraction may be avoided by placing a dry piece of cotton, of convenient size, into the cavity and injecting such quantities from time to time as have been previously gauged by positioning the limiting-nut placed upon the plunger.

The syringe electrode is supplied, as shown, with socketed points: Nos. 1 and 2 designed for such operations as will next be described, while No. 3, with pads No. 4 and No. 5, is designed for obtunding the gum or similar tissue.

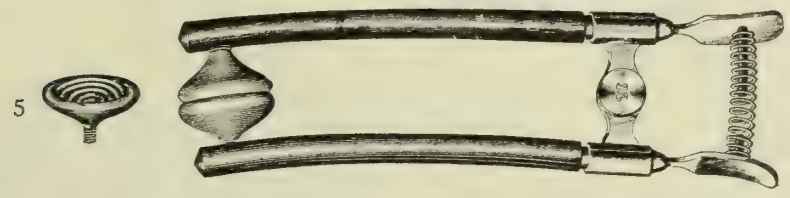
The duplex electrode (Fig. 2) may be used in obtunding the gums previous to extraction, or in immediate separation of crowded teeth, where the Perry or other separator is used. The inner spiral wire cones of the rubber cups of this duplex electrode are self-conforming and adaptable to a high degree, and are deep

FIG. 1.



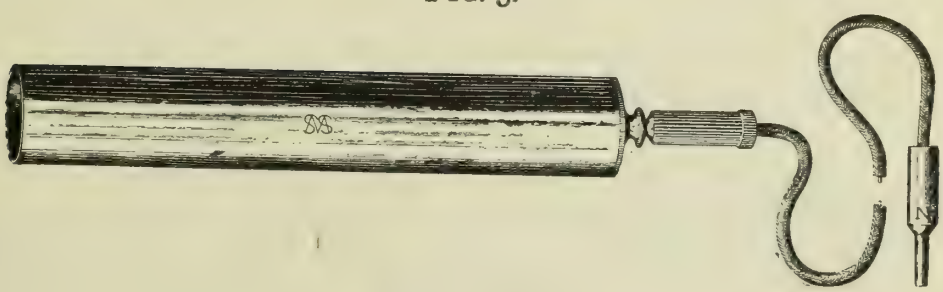
Syringe Electrode.

FIG. 2.



Duplex Electrode.

FIG. 3.



Hand Electrode.

enough to admit of a liberal supply of saturated cotton. The wire spiral insures good contact and admits of a thorough cleansing when the rubber sheathing is removed.

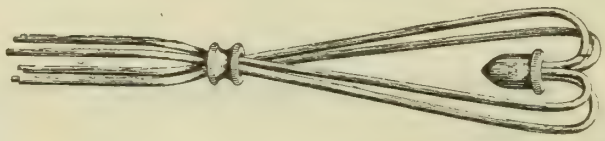
The hand electrode or cathode, shown in Fig. 3, has proved not only efficient, but cleanly. In using this electrode the palm of the hand, if naturally dry, should be slightly moistened with salt water, to insure good conduction.

The first essential in preparing the tooth for cataphoric treatment is to secure *perfect insulation.* Without it there can be no certainty as to the direction of the current,—whether it entirely or partly follows the adjacent tissues, offering less resistance, or pursues the tooth-structure itself. It would be advisable, therefore, to apply the rubber-dam, if it is at all possible to do so, and, beside

the usual ligatures, apply upon them a sufficient quantity of some good varnish (*e.g.*, sandarac varnish), to secure not only dryness, as we are accustomed to know it, but insulation from the softer tissues,—as the obtunding liquid is liable to be carried, by capillary attraction, to places remote from the tooth or part of the tooth under treatment. Having observed these precautions, there yet remains a possible chance for the current, when applied, to enter a metallic filling in the approximal surface of the adjoining tooth. This may occur either by direct contact of the electrode or by transmission along the course of connecting liquids.

What is to be done? Insulate this and any other adjoining surface, which may possibly cause a division or shunting of the current, either by a coating of varnish, as suggested, or by surrounding the tooth with a rubber tube of correct size and length. The latter can be readily applied by the tube or "nipple-expander," devised for this and similar operations, and here illustrated (see Fig. 4).

FIG. 4.



Nipple Expander.

Assuming that complete insulation has been secured, and that the cavity has been previously cleansed as thoroughly as possible without causing discomfort, a pledget of cotton large enough to barely fill the cavity may now be inserted, and sparingly saturated with, say a thirty per cent. aqueous solution of cocain.

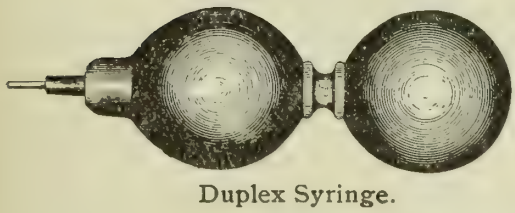
The negative electrode or cathode should be moistened and securely placed either in contact with the cheek or in the hand of the patient. The total resistance of the rheostat should be in circuit before the positive electrode or anode is placed to the tooth. All cord connections should be secure; for any looseness at binding-posts is almost sure to result in painful variations of the current, owing to imperfect contacts. If the rheostat be of the high order of resistance and nice calibration essential for careful and satisfactory treatment, the electrical sensation at the start or at any time during the operation need not approach that of pain, if sensation itself be allowed to guide the increase of voltage. Only a small fraction of one volt might be advisable at the start, but within a few minutes this may be gradually increased until five, ten, or fifteen volts have been applied. If at any time, however, during the latter part of voltage regulation (which lasts, say twelve minutes) it should be observed that a radical increase is not followed by corresponding sensation in the tooth, it is safe to conclude that a more or less complete anesthesia has resulted, at which time the electrode may be removed and the preparation of the cavity at once be completed. A second application, however, may be required in some operations. The time required will vary according to the

conditions; so the conservative operator will labor first for successful results, and let subsequent efforts and growing judgment assist him to economize his time in the future. This is not a speculative article, otherwise we might here appropriately attempt to measure the possible future developments in electro-therapeutics, in its two interesting phases.

In the direct treatment of pulps, the efficiency of cataphoric anesthesia has been especially marked, and, fortunately enough, the relief thus afforded has been effected where relief is most needed and appreciated by both operator and patient.

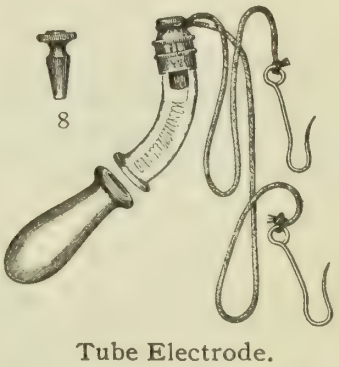
The advantages to be derived from immediate pulp-extraction are so obvious that special comment thereon will here give place to essentials of the method by which the pulp may be satisfactorily anesthetized for the operation. While the details of operative preparation do not differ from the methods previously described for obtunding sensitive dentin, it should be remembered that nerve-tissue offers less resistance both to the electrical current and to the diffusion of the medicament applied, and that this resistance will

FIG. 5.



Duplex Syringe.

FIG. 6.



Tube Electrode.

always be more or less modified by the condition of the pulp and the extent of the exposed part through which it is to receive general medication.

When the exposure is extremely limited, it is advisable to let the first medication serve only as a means for gaining better access and a greater exposure of pulp-surface, as a preparation for the complete and final anesthesia.

A clean pulp-surface is essential, and, therefore, the application of three per cent. pyrozone immediately before the cocain solution is applied is advisable as a final preparation. When the cocain and current are applied, the sensation which follows need not be painful, if delicacy in rheostat manipulation be observed.

The sensation which the current produces, however, will gradually subside as the cocain becomes effective, and as this occurs the voltage should as regularly be cautiously increased and the current continued until it is observed that radical changes in voltage fail to produce a corresponding sensation in the pulp, at which time it may be extracted without pain.

Figs. 5 and 6 represent instruments especially devised for cataphoric bleaching of devitalized teeth, the results of which have been especially satisfactory with this method of treatment, a de-

scription of which, with reference to the illustrated devices, will now follow, and include such essentials in manipulation as have led to such gratifying success.

These same appliances may be similarly and satisfactorily utilized, with cocain solutions, in obtunding large or compound cavities, or teeth undergoing the grinding process which usually precedes the fitting of bands and caps intended for bridge abutments.

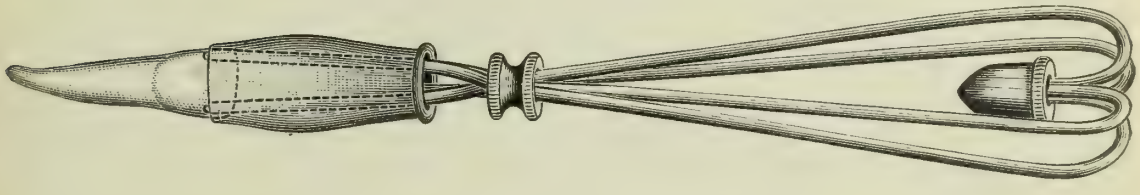
In referring to twenty-five per cent. pyrozone, used as a bleaching agent, it would be well to state that its conversion into the aqueous solution is essential, for the reason that the rapid evaporation of the commercial ethereal solution is objectionable, and besides, is not favorable to good insulation. The aqueous solution does not affect rubber, and has the additional virtue of better conductivity. The small glass tube, containing the ethereal solution, should be held nozzle downward within and near the bottom of a deep graduate or other glass vessel, when the attenuated end is broken,—otherwise the greater portion of its contents may be lost, owing to the force of discharge. The solution thus obtained should be at once emptied into a small graduate and an equal quantity of distilled water added; this will take up the hydrogen dioxid, and the elimination of the ether can be effected by the cautious application of a moderate heat, all of which should be quickly done immediately before the intended application to the tooth. With the object of bettering conductivity, a small quantity of zinc sulfate (one grain to the dram) has usually been added to the aqueous pyrozone. While no assurance can be given that the additional zinc sulfate takes any part in the bleaching process, it has been suggested by Dr. Kirk that the property of coagulating albumin possessed by the zinc sulfate, while it probably does not assist in producing the change in color observed, tans or coagulates the bleached organic contents of the dentinal tubule, converting it into a relatively unalterable compound, thus tending to prevent a return of discoloration and securing permanency. Therefore, the addition of zinc sulfate is recommended.

Perfect insulation is especially essential in cataphoric bleaching, and if the tooth have an apical opening, both internal as well as external insulation is a necessity. The apical opening of the root should be effectually sealed with gutta-percha or some equally good insulating material, and the canal and pulp-chamber thoroughly cleansed. In fact, all dentin surface should be as clean as possible, and free from unnecessary insulating material, for it must be remembered that it is through the tubules in the tooth-structure that the pyrozone effects the change of color, and that any needless excess of discolored matter left on any surface of the dentin or within the root-canal must proportionately weaken the solution applied. Taking, for example, an upper or central incisor, as illustrated in Fig. 8, which has, say, an opening on the palatal surface, and assuming that all essentials of preparation have been observed, the desired external insulation is secured by the application of a perforated rubber nipple, by means of the expander, as shown in Fig. 7.

With ligatures, the constricting end of the nipple may be secured around the tooth thus inclosed, while into the outer or open end, the glass tube (Fig. 6), containing a platinum-coil electrode, is inserted. Into the (metal-tipped) outer end of this tube should now be placed the nozzle of the duplex syringe (Fig. 5), the lower bulb of which should first be collapsed, when upon release the nipple itself will collapse around the tooth,—at which time, a little varnish applied around the neck of the tooth will effect good insulation, thus illustrating one function of the duplex syringe. It would be well to observe that the two bulbs of this syringe have a separate function and only mechanical connection, having a common but double nozzle; the nozzle of the outer bulb being long enough to pass completely through the lower bulb, the latter having a shorter but larger nozzle, which exactly fits into the metal tip of the tube electrode. The two bulbs have no atmospheric interchange except when applied to the tube, as previously described.

When the tube electrode and nipple have been supported by

Fig. 7.



means of the hooks and cords, as shown in the illustration, electrical connection may now be made. The aqueous pyrozone is injected into the nipple and tube in the following manner:

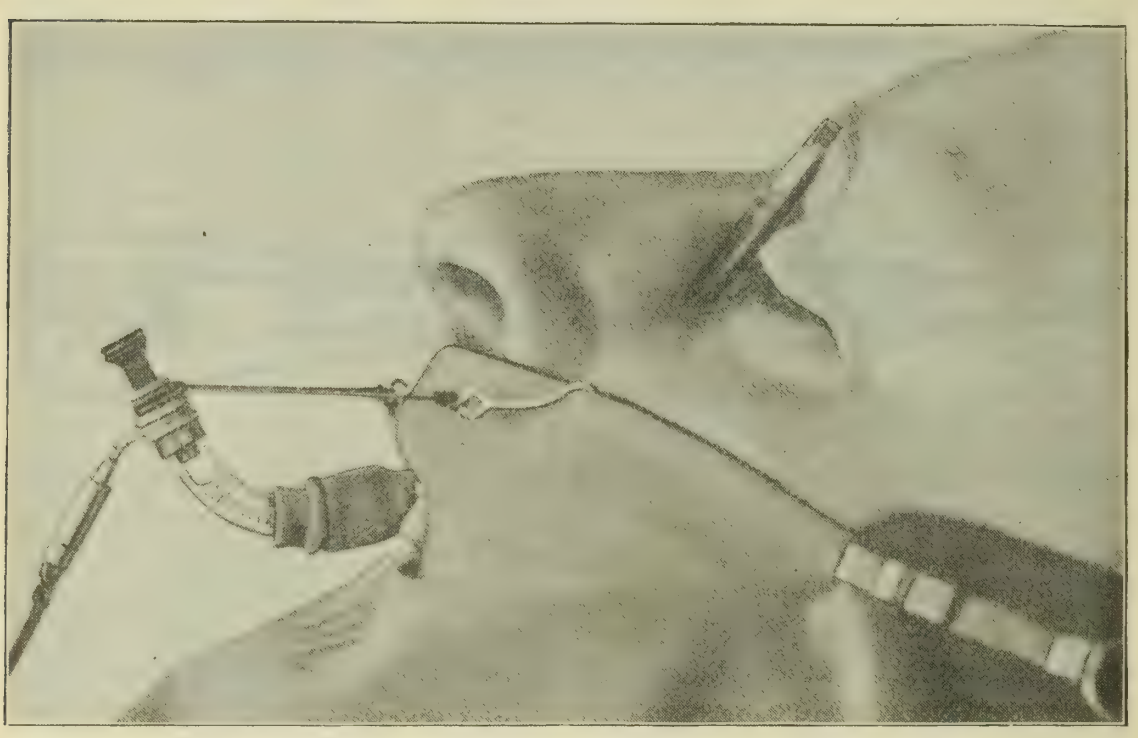
The functions of the bulbs of the duplex syringe being separate, as previously stated, the pyrozone is drawn into the outer bulb in the usual way. The lower bulb is now slightly compressed and the common nozzle inserted into the end of the tube electrode. The second and third functions of this syringe will be obvious upon the release of the lower bulb, at which time it not only frees the nipple and tube of air, but also causes the liquid in the outer bulb to rush in (assisted by compression of the outer bulb) to take its place. When carefully manipulated, spilling of the pyrozone can be avoided, for the reason that when the tube has been filled to the mouth of the larger nozzle, the lower bulb takes up the excess. When the syringe has been removed from the tube electrode, the stopple (No. 8, Fig. 6) is inserted, thus confining the pyrozone.

The current may now be applied, with comparative rapidity, if the insulation be perfect, until twenty-five volts have been indicated. It should be borne in mind that devitalized teeth usually show a much higher resistance, and consequently admit of a comparatively high voltage, with little or no sensation to the patient. When sensation from the current does occur, it is liable to be misleading, differing as it does from that produced in sensitive dentin.

Therefore, the operator should be guided by the sensation produced upon the patient and the reading of the milliamperemeter.

In testing insulation the milliamperemeter is indispensable, but the average resistance of a perfectly-insulated devitalized tooth under given voltage must, of course, be known. With a twenty-five-volt pressure, experience has shown that a current of more than three-fourths of one milliampere is rarely recorded by the meter. Should the insulation be imperfect, two, three, four, or more milliamperes might be recorded by the instrument before twenty-five or less volts have been applied. This alone should cause the operator to pause and endeavor to locate and remedy the leak or "electrical shunt," which might otherwise have defeated a cataphoric action of the bleaching agent.

FIG. 8.



The platinum coil within the tube electrode acting as the positive terminal or anode, should at all times be kept well submerged to insure good electrical action, which is indicated by small bubbles of oxygen accumulating around the coil. The accumulation of these bubbles of gas will prove an effective insulation unless the tube be occasionally tapped sufficiently to dislodge them. The gas thus liberated, finding no escape at the end of the tube, may at times cause sufficient pressure upon the liquid to cause a distension of the nipple, therefore the stopple should be occasionally removed, otherwise a troublesome leakage at the neck of the tooth might be thus occasioned. The time required for bleaching with pyrozone by this method will, of course, vary according to intensity and character of discoloration, but thirty minutes will probably approximate the average requirement. It has been objected that the use of the rubber nipple obscures the tooth, leaving it a matter of judgment only as to the bleaching progress being made.

While this is quite true, it is of little consequence, owing to the fact that the bleaching effect of the pyrozone is noticeable for several hours after the appliances have been removed. Moreover, the advantage obtained by such perfect isolation and insulation afforded by the nipple more than compensates for the time required to make a second adjustment of the devices, were it to be found necessary. Should it be desired, during the bleaching process, to inject a fresh supply of pyrozone, the nipple contents may be withdrawn through the tube and the renewal similarly made with the duplex syringe.

The question of permanency of color effects produced by pyrozone through electrical agency is an interesting and important one,—interesting because of the general diffusion which especially characterizes the above method and the hope which new things inspire. The fact that ten months have elapsed without appreciable change of color in the tooth first successfully bleached by this method forms a reasonable basis for the hope that comparative permanency of color may yet follow our efforts to bleach devitalized teeth.

Anticipating any question that may arise in the mind of the reader concerning possible injurious effects as a result of cataphoric medication, I desire to state that my own experience, and, so far as I have been able to learn, the experience of other experimenters, would justify the statement that no permanent injury will result from an intelligent and conservative utilization of the principle involved, and that any temporary discomfort resulting from its use is more than compensated by the benefits derived.

Some operators also object to the time which cataphoric treatment requires. Let me state in this connection, and in conclusion, that, since it is *Time* that measures the *good* we do, since it is *Time* upon which floats the buoy of Hope, let *Time* prove the limitations of that which *Time* has at last brought us,—Cataphoresis.

The Employment of Dentists in the United States Army.

BY OTTO ARNOLD, D.D.S., COLUMBUS, OHIO.

At a recent meeting of the Ohio State Dental Society a resolution was adopted advocating the employment of dentists in the United States army.

This resolution refers briefly to the necessity for dental services among the enlisted men, recommending that Congress be petitioned to adopt such measures as will provide this special service, and also that every dental society in the land adopt a similar course in furthering the interests of humanity. The resolution also provided for the appointment of a committee of one, to be empowered to represent the interests of the Ohio State Dental Society in this direction.

Our Government expects its soldiers at all times to render prompt and efficient service, and demands primarily that the

recruit be physically sound. It has an established standard of soundness, and in order to prevent others than those reaching it from being accepted, subjects all applicants to a medical examination, which decides his fitness or unfitness to serve in the army of his country. Furthermore, not content with what the enlisted man is physically, the Government attempts to maintain this standard, and environs him with comfortable and sanitary quarters, furnishes sufficient and wholesome food, exacts adequate and appropriate exercise and personal cleanliness,—in short, throws about him every safeguard known to science for the furthering of his physical welfare. Furthermore, should he be stricken with disease or disabled from any cause, he is cared for in well-equipped hospitals and attended by skillful surgeons. Thus every need seems provided for.

But is this absolutely true? How about his dental organs? Surely the soldier is human; therefore, his teeth are an important part of his physique, and if they become diseased or are extracted, the whole organism suffers, in consequence, more or less. It seems not a little strange that our nation should not before this have included the treatment of teeth in its medical service.

Granted that the entrance examination is thorough and includes in its requirements the possession of a sound set of teeth, there still remains the susceptibility to the insidious process of dental caries, which is no respecter of persons and has no limit; for other diseases may come and go, but dental caries, when once begun, like the brook, "goes on forever."

The mere act of passing from civil to military life does not render a man immune from dental caries, and it is well known that men thus afflicted suffer greatly,—indeed, are often from this cause totally disabled for a greater or less period from discharging their regular duties. Therefore, it seems only reasonable that some adequate provision should be made to supply this branch of medical science, thereby improving and, to that extent, completing the medical service of our army. Thus far the only remedial process at the soldier's command has been the extraction of the offending teeth, the operation usually being performed by the hospital stewards,—men without any dental training, from whom it would be unreasonable to expect the necessary knowledge and skill to successfully practice this branch of surgery. Even if they were experts in extraction, the result of their operations would be the loss of what were intended for useful organs, the certain impairing of masticating facilities; and who can estimate the ultimate effects upon the constitution in general?

Indifference to the needs of her servants is not in keeping with the generous policy which usually characterizes this nation; therefore, the dentists and medical men of this country, by virtue of their knowledge of existing circumstances, earnestly appeal to every member of Congress to aid in the enactment of a law that will supply this manifest deficiency.

Dentists, as members of the examining boards, would undoubtedly be valuable acquisitions in preventing the admission of men

with defective teeth, and in this particular alone would render valuable service. Furthermore, in cases of gunshot wounds and other injuries about the mouth and face the dentist's special knowledge of this region and his skill in devising and adapting appliances that may be necessary for their treatment pre-eminently qualify him for managing this class of cases, which the vicissitudes of war often present. Altogether considered, the dentist is a necessary factor, no less in the army than in civil communities.

It is earnestly desired and requested that all members of the dental profession will personally lend their aid in helping on this noble cause, and enlist the services of their representatives in Congress to support an enactment with this end in view. If this matter is brought before the minds of those who rule the affairs of our nation, we may hope that they will speedily add this branch of healing to their otherwise perfect system for the care of those who are the safeguard of our nation on our coast lines and frontiers.

A Peruvian Cranium with Suppressed Upper Lateral Incisors.

BY GEORGE A. DORSEY, PH.D.,

ASSISTANT CURATOR OF ANTHROPOLOGY, FIELD COLUMBIAN MUSEUM, CHICAGO, ILL.

In the more recent phylogenetic history of man's face, each bone which enters into its formation has been greatly modified. This is especially true of the bones which comprise the jaws. As man's forehead has become more and more prominent, the prognathic character of the jaws has greatly diminished, and at the same time there has been a corresponding decrease in the total length of the hard palate. As the hard palate decreases in length, one of two results follows: either the alveolar arch shortens, and thus there is a diminished extent of the dental arcade, or the alveolar arch remains of normal absolute length, and thus there results a greatly increased breadth of the hard palate. Here we are especially concerned with the absolute decrease in the total length of the alveolar arch.

Variations in the total length of the alveolar arch give rise to innumerable variations in the number and position of the teeth. Thus, it is quite likely that man has already lost a fourth molar and a third premolar, while the third molar is in a fair way to complete suppression.

Atrophy or complete suppression of the third molar is a common occurrence among the European races, and from the examination of a large series of pre-historic American crania it seems that about fifteen per cent. of the crania are without the third molar on one or both sides. Other variations in the number or arrangement of the teeth are very frequent, and it is surprising to find how often this is the case among aboriginal American crania; thus, as in a "Mound-builder's" cranium in the Field Columbian Museum, there may be a suppression of one pair of the premolars, in addi-

tion to the suppression of the third molars. Malposition of one or more of the incisors is very frequent; there may be suppressed one or both pairs of the upper incisors, due to variation in the size or condition of the intermaxillary bones. These bones may be altogether absent, as in cleft palate, or they may be so reduced in size as to be incapable of bearing more than one pair of incisors, which naturally is always the inner or central pair.

There are a number of cases on record in which the lateral incisors are of an atrophied nature. Such a case of retarded development is figured by Weidersheim.* Again, the lateral incisors may be completely absent, and a number of such cases have been recorded in medical or dental literature.

But none of the cases so far described relate to American crania. The cranium under consideration is one of several found by the writer in a rock tomb at Huaracondo, a small town near Cuzco, Peru. The race represented may be considered the Inca, a branch of the extensive Suichua stock. From Fig. 1 it may be seen that all the teeth are well formed and in good alignment. Turning to

FIG. 1.



the hard palate (Fig. 2), there can still be made out the course of the pre- or intermaxillary suture which confines the incisors and marks off the premaxillary from the maxillary bones. In connection with the suppression of the lateral incisors, due to a congenital defect in the size of the premaxillary bones, it is interesting to note the general effect which is seen on the hard palate as a whole. This may best be noted by resorting to the palate indices. The general index (Broca), or relation of the maximum breadth of the palate compared with its maximum length, is 93. This is very high, for the average normal variation only ranges from about 63 in the New Caledonians to about 80 in the Lapps, although an index as high as 100 has been recorded in a cranium from Solutre, France.

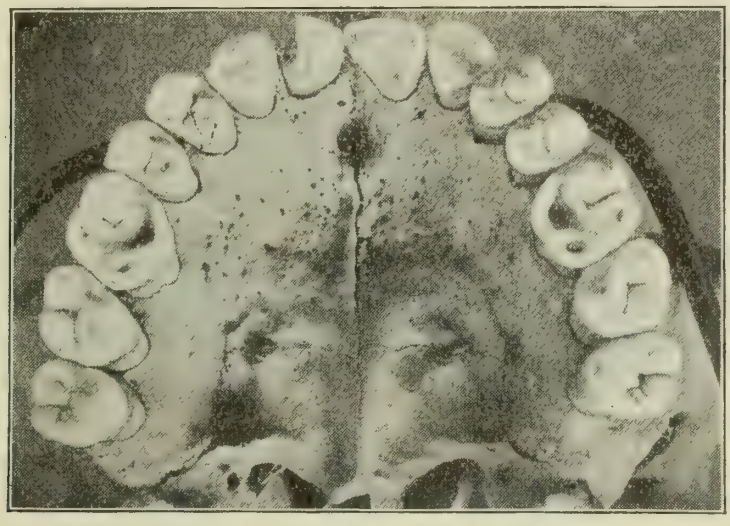
Again, the index for the alveolar arch, or relation of the maximum length of the palate compared with its maximum breadth of the arch on the labial surface, is 136. This index is much higher

*"Structure of Man," p. 158.

than the average in any race. In fact, the extreme height of this index can only be appreciated when it is compared to the classification of Turner* for this form of palate index. In that classification the lower limit of the Brachyuranic group is 115; the Mesuranic group ranges from 110 to 115; while the Dolichuranic group falls below 110.

It may not be without interest to note also the dental index. This, according to Flower,† is the relation of the length of the distance between the outer surfaces of the five molar teeth of the

Fig. 2.



upper jaw to the basi-nasal length. In the present instance the index is 42, or mesodont, and corresponds to the average among the Suichuas of Peru.

The upper molars all have four cusps, although the second molars are in what Topinard‡ calls the traditional state. The first molars, the cuspids, and the incisors are somewhat worn (No. 1 of Broca's scale); the remaining teeth are not worn to any appreciable extent.

Combination Gold Plate with Continuous-Gum Attachments, and Porcelain Removable Bridges.

by emory a. bryant, washington, d. c.

I suppose I should offer an apology for presenting a subject of mechanical dentistry or anything pertaining to that branch of dental art to the further notice of the profession. It is to a certain extent considered to be no longer a proper thing by some to be in any way personally connected with such work. But the time has not yet come when mechanical skill is not a required accomplishment of the successful practitioner.

*"Challenger Reports," vol. x, "Human Crania," p. 7.

†"On the Size of the Teeth as a Characteristic of Race." "Journal of the Anthropological Institute," vol. xiv, 1884, p. 183.

‡"De l'Evolution des Molaires et Premolaires chez des Primates et en particulier chez l'Homme." *L'Anthropologie,* No. 6, Nov.-Dec. 1892, p. 649.

The art of successfully restoring lost dental organs cannot be relegated to the laboratory man.

While I recognize the importance and value of the laboratory man, and fully appreciate the necessity for his employment, I still desire to uphold the dignity and importance of the prosthetic side of our work, and protest against the position of inferiority too often assigned to it by those who fail to appreciate its inherent high artistic merit and worth.

Among the variety of cases to which the methods I am about to describe are applicable, I shall refer more particularly to the replacement of missing teeth back of the cuspids of the lower maxilla, as in such cases, when substitutes are inserted by the usual methods in vogue, it has been the exception rather than the rule that such dentures have been a success; it matters not what materials were used in their construction, these dentures in the majority of cases were partial, if not complete failures. The plain clasps were added to partial plates to confer upon them greater stability, and sometimes the wearer succeeded, in a way, in getting enough use from them to justify the trouble of retaining them in the mouth before the clasp wore the tooth out to which it was attached.

But for the purpose of mastication they are as a rule miserable failures. Following plate-work, bridges were indicated, and these have to a certain extent helped us out, but for perfect satisfaction to both the patient and operator the clasp partial plates herein described will be found to be an improvement which fills a long-felt want. This is especially true where all the teeth are missing back of the cuspids in either jaw.

Bridge-work is popular because of its stability under the force of mastication, and it has been my idea to construct a removable denture which would be equally as firm and solid when in use as the bridge.

The method here presented has succeeded beyond my highest hopes. After stability, the question of materials used in the construction of the work is of next importance. For this purpose I have selected those only that are recognized the world over as the most satisfactory in cleanliness and artistic effect,—viz, gold for the base-plate, and continuous-gum for attachment and body of the teeth. The length of time required for the complete operation is not to be considered, for it depends entirely upon the case; but no matter what the conditions are, it requires more time in manipulation to the proportion of work accomplished than any other operation in dentistry. While the manipulation is simple and apparent at a glance, it is in the details that the time is consumed. Take for illustration the lower case shown in Figs. 1 and 2. The open-faced crowns are made and fitted upon the two teeth to be used as abutments; an impression is taken with these crowns in place, and the usual methods followed to make a model, die and counter, etc., and the swaging of the base-plate. For this plate I use 18-carat gold, 26 gauge. In order to make the plate sufficiently strong and rigid from cuspid to cuspid, I swage up a second piece of gold of the same thickness and solder it to the plate between these two points.

The plate is then fitted in the mouth as it is to be when finished, care being taken to relieve pressure upon the muscles as for any case. The plate is placed in the mouth with the crowns in position, and the impression taken with Teague's Impression Compound, removing crowns and plate in the impression. Into this fusible metal is run to an amount sufficient to make a good strong model. The plate is now in the position it is to be when in the mouth, and the crowns are upon a base which will not change or break.

The position of the guides on the crowns and parallel to each other is next marked, the crowns are removed from the cast and

FIG. 1.

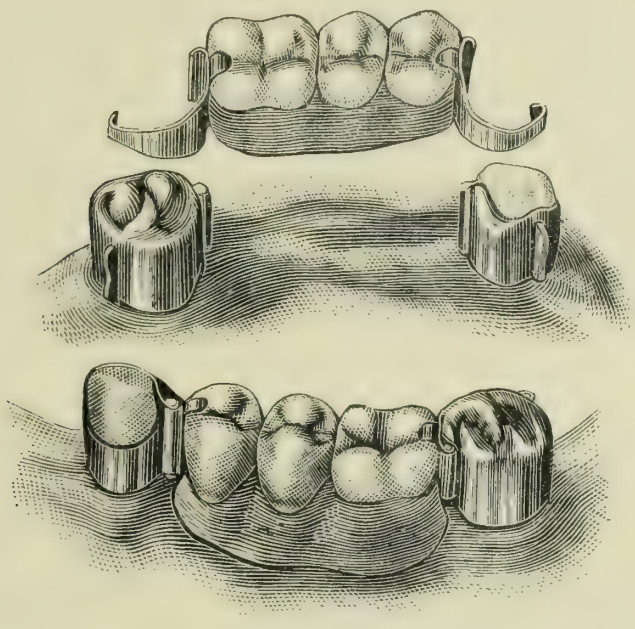
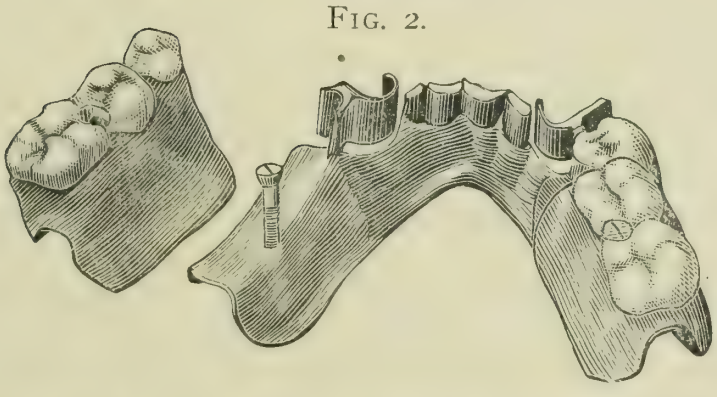


FIG. 2.



the guides soldered on. These guides should be of platinum-iridium wire, about the size of a large common pin; the clasp is fitted to the guides as close to the crowns as possible. The crowns are placed in position on the casts, with the clasps in place, and the brace to which the clasp is to be soldered is so shaped that the part to be soldered to the plate will also be the abutting edge of the porcelain. Wax in place and remove so as not to disturb their position, invest and solder the brace to both the clasp and the plate; replace on the cast and strike up a platinum base-plate about 30 gauge, over that portion of the gold plate back of the brace, using a counter of fusible metal. This should fit perfectly, so that when

the porcelain is baked on and it is set home solidly it will bear evenly all around, otherwise the porcelain will be shattered when it is subjected to the strain of mastication. The plate is again placed in the mouth with the crowns in position, and the bite taken,—wax will do; the piece is then replaced on the cast, and the bite run at the same time the cast is attached to the articulator.

The teeth are set up in wax in order to determine where the space is to be located for the attachment of the cylinder and screw-pin. The point where the pin is to be soldered is marked off and a hole drilled, nearly the size of one of the How screw-posts; the hole is then threaded by means of a tap corresponding to the post to be used. The end of the post is screwed in and afterward soldered to the plate; the other side is treated in the same manner. The pins are cut off a trifle below the occluding teeth; a hole is next drilled in the platinum plate for the pin to go through without touching the sides when the plate is in place on the base-plate. The cylinder of thin platinum is made to fit loosely around the pin, and somewhat enlarged to fit the nut, making a shoulder for the same. This cylinder is fitted to the platinum plate over the hole for the pin, and so closely that it will not require much solder to retain it in place. It is then soldered with pure gold. The plates are next placed in position, and the teeth are set up. Continuous-gum teeth are used, and from between two of them sufficient is ground away to form a recess for the platinum cylinder. From this point on the piece is proceeded with in the usual manner for making continuous-gum work.

When the final baking is completed, the two plates are cemented together either with sulfur or chloro-percha, the nuts being screwed down solidly at the same time. The abutment crowns in their respective clasps are next cemented to place in the mouth; at the same time, if possible, the plate should be removed, or at least loosened up before the cement is fully set. When hard, remove the plate and clean away the surplus cement, then replace the plate and tighten up, bending the clasps with pliers until the plate will not move without the application of considerable force to raise it. The patient should then be instructed how to insert and remove the fixture. This they can as a rule master in a few minutes.

My porcelain removable bridges are made in practically the same manner as is the clasp plate; the description of the one virtually covers the other, and therefore needs no special directions. The details in each present themselves as the manipulation progresses, and as none are complicated, I have not undertaken to cover them all,—in fact, that could not be done, as each case presents them differently.

In making removable bridges by this method, the same judgment must be used as would be required were the case to be a permanent bridge. For the lower I should not advise more than two teeth, or three in the upper, where it is to be a single bridge, between the abutments; but where it is to be a clasp plate, it makes no difference as to the number of teeth, as the lateral strain is then neutralized by the attachments upon the opposite sides of the

mouth. In the lower it is always best to cement the two by a brace-plate. In the upper there is more excuse for neglecting this brace, as the teeth are usually stronger in their surrounding tissues, and better able to withstand lateral strain.

Where the case is to be a bridge anchored at both ends so as to relieve the pressure on the gums, the screw-post and nut should always be used; otherwise, unless the work is heavily braced across the ridge, it would be liable to break. In the plates it is not necessary to use the nut, and the pin may not come through at the grinding-surface if it be so desired; the cylinder being closed at the top and porcelain being fused over it, this would give it the appearance of the porcelain being fused directly upon the gold plate. As patients and dentists do not always remain within reach of each other, and accidents will happen at times, I rather favor the showing of manner of its attachment; then if it should fall to the hands of another to make a repair, it would be apparent at a glance how he should proceed to make the separation. I always instruct my patients in this regard, and though they may forget everything pertaining to it but the fact that the piece is separable, and is separated by first heating it over a flame, the rest is apparent to whomever it may become necessary to make the repair.

The Prosthesis of Crowns.

BY HENRY H. BURCHARD, M.D., D.D.S., PHILADELPHIA, PA.

(Read before the Pennsylvania State Dental Society at Bellefonte, Pa., July, 1896.)

It has been remarked that "the time has not far passed when the reading of a scientific essay to a dental society was followed by an exodus of most of the members." To-day the conditions are almost reversed; the scientific essay is the subject of interest, and papers which deal as this one does with humdrum matters receive perhaps the minority interest. The subject is one pertaining to laboratory manipulation,—a field viewed with scant attention by the average practitioner, and cultivated by him in a corresponding degree.

My observation teaches me as an unwelcome truth that prosthetic dentistry in its several branches does not occupy the position in dental practice that its intrinsic importance warrants. A certain number of practitioners appear to hold the practice of mechanical or prosthetic dentistry as *infra dig.* Another element leave the field uncultivated, never troubling themselves to acquire the technical knowledge and dexterity necessary in successful laboratory manipulation. To the first class, the term prosthesis is preferably employed in discussing subjects like the present, for there is a dignity residing in or attached to Greek roots, which makes words derived from them palatable.

In the use of this word, the full content of its meaning should be employed. If we examine the exact significance of the title, it is found to include most of the features of dental practice which stamps its kinship with one of the fine arts, and its identity with the

subject general of engineering. This should be enough to secure its honorable recognition. Turn to the partial synonym, mechanical dentistry, and there is implied much more than the mere setting of fourteen teeth in horseshoe form and the making of gold ferrules, and this, with all due deference to the average practice in this field, represents much of the ordinary conception of the title. Let us accept that prosthetic dentistry includes first and foremost the calculations which shall serve to restore lost function and the design through which the function is given an instrument. The mechanical dentistry consists in making this instrument in exact accordance with the design. It has been remarked by one of the older microscopists—I think Jabez Hogg—that the compound microscope is the only instrument in which performance equals the theory of construction. Well, so it should be with dental mechanism. We are thus driven to either of two very uncomfortable reflections: first, that much of our work bears no likeness to the above-named instrument in point of accuracy; or else our designs as well as our productions are too often lamentably faulty. We may profitably dwell upon this word mechanical, and compare our practical application of it with that of the mechanics in other fields, let us say the jeweler, watchmaker, or engine-builder for example. Examining the work of these artisans, it is found characterized by two great features, precision and finish; turn to the products of our own laboratories, and we find too often crudity, inaccuracy, and roughness. It is out of the question to secure the same exactitude in dental prosthesis as the ordinary artisan attains, but we need not fall far short of it. We cannot secure the accuracy produced by means of an automatic lathe, but certainly we should be able to work with as much precision as the trained blacksmith; but do we?

We might with profit enter into a consideration of all laboratory operations and discuss methods through which accurate results might be obtained in all of our prosthetic endeavors, but it would require a lengthy monograph and a corps of writers to do justice to the subject. As an opening chapter to such an undertaking, the description of certain manipulations is offered which when carefully followed will give exactness in at least a few of our operations. The subject is the construction of certain forms of laboratory-made crowns.

The purpose of all crowns is to restore form, appearance, and function, and the more nearly these three objects are accomplished the nearer is the instrument to mechanical perfection. The first element for consideration is the support of the crown. The mechanical support available is secured in one of two ways; either by a post anchored in the longitudinal axis of the root, the enlarged pulp-canal, or by a band grasping the periphery of the root; the first a dowel, the second a ferrule. The prosthesis of the matter consists in first measuring and testing the mechanical base,—that is, a consideration of the condition of the root and its supports. These latter must be free from disease, or to be made so when the foundation has its greatest strength of support. Next to the strength of the base; in the anterior teeth the stress against a crown tends to drive it outward; the most effective check against this ten-

dency is a bar anchored in the enlarged pulp-canal. In a majority of cases a root which has lost but little or none of its pulp-canal walls through the invasion of caries (Fig. 1) is sufficiently strong in itself to resist the stress transmitted to it through the post of an artificial crown. The size of post required to resist stress and maintain its original form is about that baked in the Logan crown, or a flattened No. 14 platino-iridium wire. The shape of the post is an important consideration. A round post is needlessly strong in its transverse diameter; not strong enough, unless too large, in its antero-posterior diameter; hence the wire is flattened, given an ellipsoidal form (Fig. 2). In crowns having a small face area and a light occlusion the post may be made smaller, say No. 15 or No. 16.

The anchorage of the crown attended to, next comes the base of support, the face of the root, upon which the artificial crown is to rest solidly, for both mechanical and hygienic reasons. To prevent the access of the active causes of caries to vulnerable structures and to hide the line of union between the artificial crown and its base, this line should be concealed and guarded by the gum. There is no instrument by which the root face may be dressed down to its correct outline, its edge everywhere a line below the gum-margin, so accurately and expeditiously as by the rotary files of Herbst; the anterior root-edge should be almost one-sixteenth below the gum-margin.

A perfect moldine impression and a fusible metal die are made, representing the face of the root. With a buckshot or a small lead cylinder for a counter-die, a plate of well-annealed soft platinum No. 31 is swaged to fit the root face. This is reannealed. The pulp-canal is enlarged for two-thirds its length to receive the tapering post, the enlargement being carried toward the palatal wall of the canal, to avoid weakening the anterior segment, that upon which the stress is received. The root-plate is punctured, making an oblong opening immediately over the pulp-canal; through this opening the post is thrust, and its point of contact with the plate marked by a scratch. An erasing rubber, such as on the end of a lead-pencil, now serves as a finishing counter-die in the final swaging of the plate. A film of softened black wax is placed on the under surface of the plate, which is laid upon the root face, and there pressed into perfect apposition by means of the rubber. Withdrawn from the roots, the outlines of the latter are marked in the black wax; the plate is filed down to this outline and reapplied to the root, pressed into position (Fig. 3), and the post is thrust home through its opening; by bending the edges toward the opening, they will grasp the post and hold it in position. Catching the protruding end of the post, it and the plate are withdrawn. Borax is painted around the line of union, on its upper side, and the pieces are united by means of 22-carat solder. Reapplied to the root, the adaptation of the plate is perfected, a bite, a shade, and a plaster impression are taken; the latter should be most accurate. A tooth in exact anatomical and esthetic correspondence is selected

and ground to fit perfectly, the projecting post being cut down to within one-thirty-second of the root face, to admit the porcelain. Straight-pin teeth are to be used in preference to the cross-pin. The tooth from immediately above the upper pin is beveled to its cutting-edge; its base is cut out, leaving the porcelain in contact with the plate edge. Should the tooth be too yellow, a backing of platinum may be employed; if too blue, one of pure gold. The backing, to insure protection of the porcelain edge against fracture, should be in two laminæ; the first, that in contact with the porcelain, of No. 34 metal. Twenty-two-carat gold is the usual material employed; it may be adapted perfectly, and alters the shade of the tooth but little. A piece of plate about No. 34 is fitted to cover the palatal surface of the porcelain entirely, and filed flush with the edges of the tooth. Over this a second backing of Nos. 28 or 27 is fitted (Fig. 4), covering the first completely. Tooth and backings are boiled in a sulfuric acid solution. The thin backing is placed in position, painted with borax, and the second backing adjusted. These thin backings may be pressed into accurate apposition with

FIG. 1. FIG. 2. FIG. 3. FIG. 5 FIG. 6.



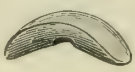
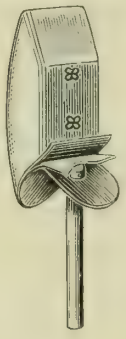
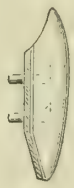




FIG. 4.



the tooth by means of an erasing rubber. The post and plate may be loosened and removed by excavating the plaster until the end of the post is exposed, when an instrument is pressed against it, lifting it from position. The plate and post are boiled in acid and reset upon the model, and the tooth cemented to position by means of adhesive wax. Removed from the model, it is moistened and carefully invested in a mixture of sand and plaster. The adhesive wax is picked out, not boiled out. To fill the depression between the base of the tooth and the plate, a leaflet of platinum No. 50 is bent upon itself and set under the tooth; the leaflets are separated, one being pressed into accurate contact with the plate, the other with the base of the crown (Fig. 5). The space between the leaflets is then filled with small pieces of platinum plate. The entire surface is boraxed, carefully avoiding contact of the latter material with the porcelain. Borax forms when fused upon porcelain a glass which unites with the enamel, shrinks in cooling, and the enamel is checked. A liberal supply of 20-carat solder is laid upon the stay and plate; rarely less than one-third pennyweight is needed to produce the required contour. The case is heated from the investment side until the solder begins to fuse, when a fine flame is directed against the backing until the solder melts and flows like water, filling every crevice. When cool, the crown is boiled in the

sulfuric acid solution, dressed down to an accurate occlusion with the antagonizing teeth; is smoothed and polished until there are no imperfections, even minute. Placed upon the prepared root, the crown should now fit perfectly.

Should a root have been materially weakened through the progress of caries (Fig. 6), or be structurally weak, it is advisable to employ a device which shall guard the root against fracture. The post and collar crown is applicable. It is to be remembered that the collar or ferrule in such crowns is a means of strengthening a root; as a mode of retaining an artificial crown it is a supplementary support. The principle of fitting all ferrules, whether for a post and collar crown, a porcelain-faced barrel crown, or a barrel crown itself, is the same. The gold employed is to represent lost enamel, and should possess the characteristics of the enamel-cap in so far as they may be restored by metal. First, it must be at every portion of its edge in close contact with the root; second, it must be entirely free from roughness; next, it should not be mechanically irritating to vital structures. The edge of the enamel-cap is usually about one-sixteenth below the gum-margin; the line of the latter represents quite closely the edge from the enamel.

It follows, therefore, that the proper depth of a collar is usually about one-sixteenth inch beneath the gum-margin; also, the removal of the enamel from the underlying dentin leaves the root-neck in such a form that a ferrule may be accurately adapted to it. Perhaps the most effective instrument for removing the cervical portion of enamel is the enamel cleaver of Dr. Case.

There are two methods of fitting a ferrule,—one upon a model, the other in the mouth. In either event, the first step is an exact measurement of the periphery of the root. The root denuded of enamel is encircled by a piece of annealed brass wire, No. 33; the ends of the wire are passed through the openings of a Kirk's dentimeter, and a measurement taken. The wire is then cut at a point opposite the joint. If a plaster impression has been taken, a pattern of the collar is bent upon it, the foil flattened and set aside.

A piece of 22-carat plate No. 29, the exact length or slightly shorter than the straightened wire, is cut; its width equal to the distance from the gum-margin of the root to be crowned to the cutting-edge of the antagonizing teeth, if for a barrel crown, and about one-eighth inch wide if for a ferrule crown. The tin pattern, if one has been made, is laid upon this rectangle of plate and the cervical outline marked by a scratch, and the exact length of the wire marked. The plate is cut, and filed and smoothed to these lines. It is next annealed and bent into a cylinder. The squared edges, which are to form the joint, are bent past each other and then abutted, the elasticity of the metal holding them in close contact. A line of borax is painted along the joint, a minute portion of 22-carat solder is laid inside over the joint, and fused by being held over a Bunsen flame (Fig. 7). The cylinder is now bent to fit the root either upon the model or in the mouth; in the latter event the trimming of the cervical line of the cylinder is to be done. The cylinder is pressed over the root, and is cut away where necessary

until its edge corresponds with the line of the gum. If for a collar-and-post crown, the anterior portion of the collar is cut, and if necessary the root also is cut down until the edge of the gold is just visible along the gum-margin (Fig. 8). The line of gold should have the crescentic form of that portion of the gum line so that the cervical line of the artificial crown shall correspond with that of the adjoining natural crown,—a point of no little importance esthetically.

The collar removed, it is boiled in acid, or heated and dipped in acid, washed and dried, and its upper edge filed square. It is laid upon a flat piece of 24-carat plate, No. 32, and caught at one point with a minute piece of 22-carat solder.

A flat burnisher passed over the plate presses it in close contact with the top of the collar. The line is boraxed and the soldering completed, using a minimum of solder. The surplus gold is trimmed away; the anterior semicircle or semiarch of the collar is smoothed and polished. Set upon the root, the cap is perforated, the post inserted, and the subsequent operations are similar to those for making the post-and-plate crown.

If the case be for a porcelain-faced barrel crown, the barrel is made as described, let us say for a bicuspid. The palatal portion of the barrel is contoured by means of contour pliers, and its sides pressed into contact with the adjoining teeth. The top of the barrel is cut down something more than one-sixteenth inch short of occlusion, and this edge squared. A sharp instrument is passed along the gum-margin, marking its line upon the barrel. A bite of the teeth of the side is taken; next a plaster impression embracing several teeth in which the barrel is withdrawn. A model is made and an articulation mounted. A cross-pin cuspid is selected which agrees in size, form, and color with the adjoining bicuspid. A line is drawn upon the barrel, a continuation of the scratch made to mark the gum line; this mark outlines that section of gold which is not concealed by the adjoining teeth. The collar is removed from the model and this section is sawn out (Fig. 9). The porcelain tooth is carefully ground to fit the lines of the collar; its cutting-edge is to be almost in contact with the antagonizing teeth.

The palatal portion of the porcelain is given a long bevel, but maintaining the cutting-edge form of the facing. The edges of the porcelain where it touches the sides of the barrel may require beveling, and the gold to be filed out and beveled to make an accurate joint, without projection of either porcelain or gold. A stay of pure gold, No. 32, is fitted to the tooth and its edges in contact with the interior of the barrel (Fig. 10). The collar and facing are removed and invested so that the interior of the crown represents an open tunnel (Fig. 11). The pins and barrel are united to the stay by means of minute pieces of 22-carat solder. When cool, the crown is boiled in acid, dried, and placed on the model, which should be done without mutilating the latter. The antagonizing teeth are well varnished, and oiled very faintly. The barrel of the collar is filled with soft plaster and the articulation brought together. When the plaster has set the articulation is opened, and

the plaster in the barrel shaved down uniformly about the thickness of No. 29 plate. The top edge of the barrel is carefully freed of plaster along its entire length, as is also the edge of the stay. The plaster is now carved into cusps and sulci in as close anatomical harmony with the articulating faces of the corresponding teeth as the occlusion will permit. To make this occlusion perfect, full models should be taken and mounted in a Bonwill articulator. The plaster is now varnished, and the crown is imbedded in a cone of plaster until the gold edges of barrel and stay are just visible. These edges should be on a level with the surface of the plaster, which is then carved into a sharply defined pyramid, and varnished (Fig. 12). A die is made of Babbitt metal; a series of three counter-dies are formed by driving the die to graded depths in a block of soft lead.

A square of 22-carat plate of No. 29 is annealed, pressed into the shallowest counter, and swaged lightly; reannealed and swaged in counter No. 2; annealed again, and the swaging completed in the deepest counter. The cap should now fit the plaster perfectly, and

FIG 7.

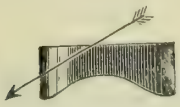


FIG 9.



FIG. 11.

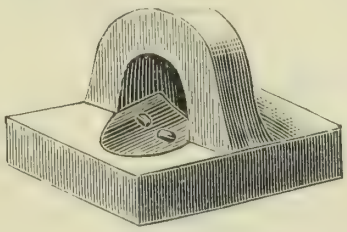


FIG. 8.

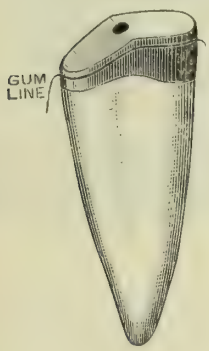


FIG. 10.



be in close contact with the top of the barrel and edge of the stay. It is next trimmed down to the edges of the latter. The collar and facing, also the cap, are boiled in acid, dried, and the cap set in position. If necessary a fine file is employed, while the cap is in position, to perfect the outlines. A liberal supply of borax is applied to the interior of the cap and barrel, and the edge lightly touched upon the outside. A piece of softened wax is then thrust into the interior of the crown, holding the cap in position. The piece is now invested in sand and plaster, cap downward, so that the interior of the crown represents a well in a cube of investing material. The layer of investment over the cap should not be more than one-quarter inch thick. When the investment is hard the wax is removed, and several squares of 20-carat solder, each one-eighth inch on the side, are boraxed and placed in the deepest portion of the well. The case is heated in a furnace and next placed under the blow-pipe, the flame of which is directed against the investment, covering the porcelain and the cap; the heat is maintained until the solder fuses and flows freely under the transmitted heat. Boiled in acid the crown is dried, dressed down by means of fine

files, and buffed until perfectly smooth and the joints are but fine lines (Fig. 13).

The method of making an entire barrel crown is similar. The barrel is formed, contoured, cut down one-eighth inch or more short of occlusion. A bite and plaster impression are taken, a model and articulation made and mounted (Fig. 14). While the neck of the barrel is held in shape and position by the encircling plaster, any details of contour are accomplished which may be required to make the crown in anatomical correspondence with the other teeth. The collar is filled with plaster, dressed and carved as with the preceding crown (Fig. 15). It is then set in a pyramid of plaster, exposing only the plaster form, and the entire edge of the barrel top. A die and counter-dies are made and a cap swaged (Fig. 16), which is placed on the plaster and barrel and filed to an accurate line of junction. The pieces are pickled and dried. The interior of the cap is painted with borax, the edge of the barrel also boraxed, and the pieces are placed together, and held by means of binding wire; any borax being carefully wiped from the outside of

FIG. 12.

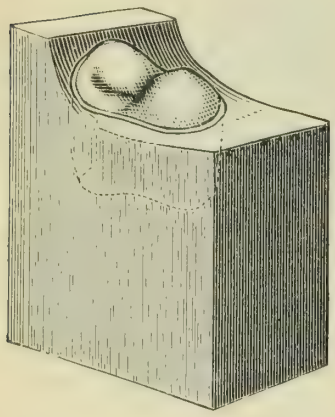


FIG 13.

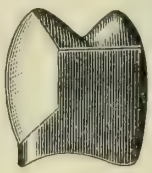
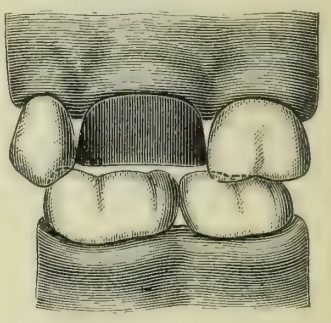


FIG. 14.



the crown. Several pieces, say about one-quarter pennyweight of 20-carat solder, are placed in the cap, which is laid upon a square of charcoal having a groove which is to underlie the cap. A fine blow-pipe flame directed under the cap soon fuses the solder, uniting cap and barrel, none of the solder flowing upon the outer portions of the crown. When dressed down and buffed the only evidence of solder should be two fine joints, one the line between cap and barrel, the other that made in forming the basal cylinder.

The advantages of crowns made as described are accuracy of adaptation and esthetic results. The crowns are anatomically correct, and their finish more nearly approximates the work of the jeweler than if made by the usual time-saving methods.

The principle of constructing porcelain-faced barrel crowns may be employed with anterior teeth containing vital pulps.

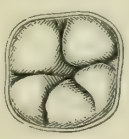
PORCELAIN CAPS AND GOLD BARRELS UPON MOLAR ROOTS.

In cases in which the stump of a first molar is to be crowned, and where the exposure of the gold of a full barrel crown would be objectionable, the following method at times may be found applic-

able. The stump is dressed for the reception of a barrel, the buccal wall being cut down to the gum-margin. A barrel as for a full gold crown is made, cut down one-eighth inch short of occlusion, a bite and plaster impression are taken in which the barrel is removed. The articulation is mounted upon a crown articulator.

A scratch is made along the buccal wall of the crown, marking the height of that portion of the stump; the scratch is continued upon the approximal wall, marking the outlines of the segment of gold, which is made visible through the movements of the lips. A measure of the periphery of the top of the barrel is taken by means of a dentimeter, and the circlet of wire set aside. The section of the barrel outlined by the scratch is sawn out (Fig. 17). A plain rubber molar having but a thin layer of porcelain between its masticating surface and the cut-away in which the pins are set, is selected;

FIG. 15. FIG. 16. FIG. 17. FIG. 18.



the wire measurement is used as a guide for the size of the tooth; not more than two or three molds of teeth in the largest stocks are of the proper form, which limits the application of this device. A tooth is selected whose cervico-buccal outlines agree with the line of metal in which they are to be set. The wire measurement should slip readily over the borders of the masticating surface of the crown.

A block of soft wax is set in the barrel, the crown pressed in it, and any grinding done which may be necessary to perfect the occlusion and the joint between the porcelain (Fig. 18).

The heads of the platinum pins are cut off, the facing cemented into position on the barrel, and the piece is invested, porcelain downward.

The wax is picked away, and a 24-carat backing, No. 34, is fitted to the exposed porcelain, touching the interior of the barrel at all portions of its length. The stay is soldered to tooth and barrel by means of a 14-carat solder. The heating in these cases must be deliberate and uniform.

IDENTIFICATION BY MEANS OF THE TEETH.

BY ALTON H. THOMPSON, D.D.S., TOPEKA, KANSAS.

THE value of conspicuous and distinctive physical signs for the purpose of identification of the persons of individuals of our race, is held to be of the highest importance by physicians and others who have charge of soldiers, sailors, criminals, and other classes of whom physical records are kept. In life insurance, also, physical signs for the identification of bodies after death are of the greatest value, as these are the principal dependence. In cases of dis-

pute where large amounts are involved, the importance of these signs is very apparent.

Of course systems have been devised for the utilization of the various external peculiarities of the body for identification, and a considerable literature has been accumulated upon the subject. It is our purpose at present to note only, however, an important article which appeared in the *American Anthropologist* (Washington, D. C., September, 1896, p. 295), by Dr. C. H. Alden (Assistant Surgeon-General U. S. Army), upon "The Identification of the Individual, with special reference to the system in use in the office of the Surgeon-General, U. S. Army." He gives in detail the system of identification in use in the army, by means of which records are kept of all enlisted men, with reference to anthropometric measurements, complexion, color of hair and eyes, skin marks, scars, moles, tattooing, etc. The system employed is founded on that of M. Bertillon, which has been in use in Paris since 1882, and is now adopted, with but little modification, by the armies and prison authorities of Europe. Bertillon's system has been adopted by the Wardens' Association of the United States, and is now in general use in the penitentiaries, prisons, houses of correction, and police departments of the United States for the recording of the physical peculiarities of criminals. But it is rather cumbersome, as it involves photographing the individual in two or more positions in addition to an elaborate arrangement of tabulated anthropometric measurements, marks, etc. Dr. Alden says, "The Bertillon system is thoroughly scientific, complete, and comprehensive, and has demonstrated its thorough efficiency and adaptation to its purpose by the success with which it has been practiced for the detection of criminals and its extension to almost all civilized countries, including Japan. The U. S. Army system is a sort of 'short cut;' it is simpler, avoids the use of special instruments and camera, but has demonstrated its value and efficiency by the results it has accomplished. In accordance with orders issued in April, 1889, for every man who enlists or re-enlists the medical officer makes out an outline figure card, which shows name and organization, age, height, color of hair and eyes, complexion, scars, tattoos, moles, etc., on both front and back of body. These cards are kept in the Surgeon-General's office, filed alphabetically."

But in all the systems of identification in use, it is a source of wonder to our profession that the signs furnished by the teeth have been so persistently and curiously overlooked, thereby excluding valuable data for the purpose, which could be utilized to advantage. It is strange that these signs have not been employed also by life insurance companies for the identification of the body after death, especially in view of the fact that the teeth are the least perishable of all the tissues of the body, and remain after the latter have been destroyed,—whether by fire or decomposition. The number of signs presented by the teeth, both of natural indications and of artificial operations upon them, is so varied and extensive that they really provide an amount of valuable data that cannot be equaled by all the other physical signs of the body together. In view of

this fact our profession urges that these signs should be utilized for the purpose under consideration, both in the record of the classes of whom such records are kept, and by life insurance companies.

A simple system of record of the peculiarities of the teeth and of artificial operations upon them could be devised which, in the hands of a competent observer (who would need to be a practical dentist), would furnish reliable and less perishable evidence than the other external signs of the body. Every dentist keeps a record of his operations upon some sort of a chart, for his own protection and convenience, and numerous instances have occurred where the dentist has assisted materially in the identification of the remains of persons for whom he had operated, by his own records. Such a chart could be incorporated in the examination records made for the identification of individuals, on which the dental peculiarities could be recorded in a manner that would be permanent and that could be easily read by another expert. Even if some teeth were lost in the course of years, many signs would yet remain on other teeth. Thus the peculiarities of the shape and width of the arch, the size, color, and shape of the teeth; teeth missing or broken off; fillings on any position; diseased teeth, cavities, etc., could be easily recorded with sufficient clearness to enable the record to be readily compared with the subject by another expert at any subsequent time. The simplicity and value of such a record will commend itself at once to the dental profession, but we need to unite to urge upon our medical friends and the laity the great importance of observing dental peculiarities for the purpose of identification,—whether of the living or dead body.

By way of suggesting a scheme for the tabulating of these dental peculiarities, the following plan of classification is proposed, which covers all the conspicuous features of the teeth and surroundings, and enables them to be utilized. Of course this scheme is merely tentative, and could be modified and improved by discussion and suggestions. It is offered as a step in the direction of the systematic utilization of the data furnished by the teeth for this purpose, and with the hope that an interest may be aroused in the subject by the profession, to the end of the adaptation of some such plan by those interested in the subject.

Classified list of dental peculiarities for the identification of the bodies of individuals.

(a) Curve of the arch—whether square, round, or V shape, or modifications of these forms.

(b) Width of arch (in centimeters)—from buccal faces of upper first molars.

(c) Height of vault—from occlusal surfaces of upper first molars.

(d) Color and texture of gums, peculiarities of rugæ, etc.

(e) Size of the teeth—whether large, small, or medium, or if worn down.

(f) Shape of teeth—as to being wide or narrow, long or short; also comparative size of centrals and laterals.

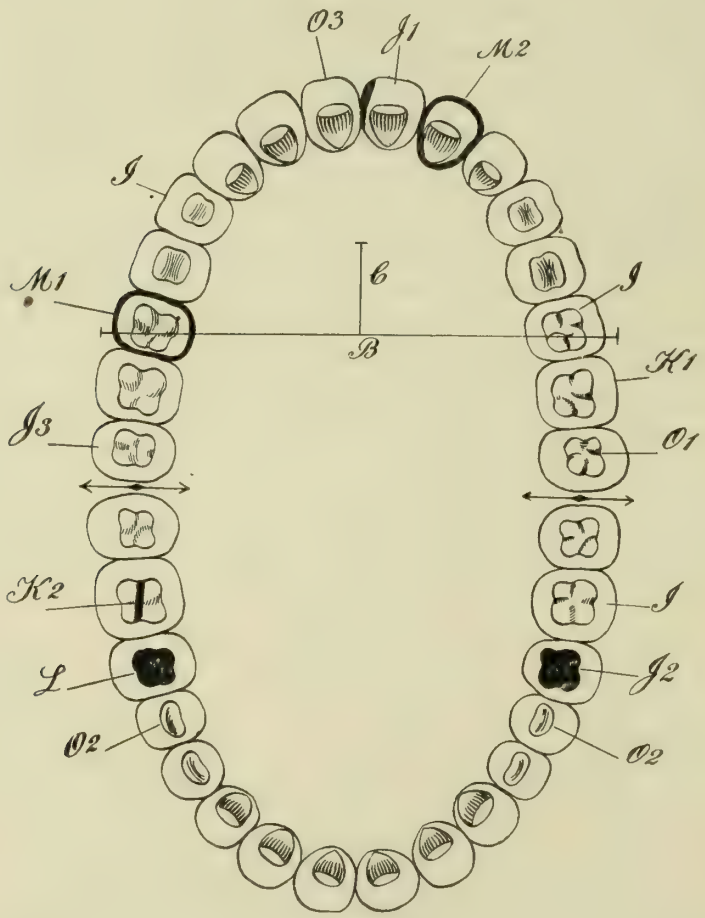
(g) Color of teeth—white, cream color, yellowish, bluish, or modifications of these colors. (N.B.—This factor would be modified by time, the use of tobacco, and other habits which would need to be taken into consideration.)

(h) Irregularities of the teeth—as to position, crowding, malposition, torsion, etc.

(i) Teeth absent—absent totally, or only broken away with roots remaining.
(j) Fillings in teeth—noting positions on tooth-crown, and materials of fillings.
(k) Cavities of decay unfilled.
(l) Diseased teeth—dead teeth, chronic abscesses; pyorrhea pockets, etc.
(m) Artificial tooth-crowns—porcelain, gold, or bridge teeth.
(n) Artificial teeth on plates.
(o) Miscellaneous peculiarities—such as abrasion, pits, markings, etc., on the labial faces of crowns; lingual cusps; tri- or lower second bicuspid bicuspids; tricuspid upper molars, dwarfed or enlarged third molars; abnormal forms of any teeth, etc.

Many of these characteristics might be perishable, of course, and of value only for a limited time, but others are of permanent durability and would last while the teeth themselves lasted. The perishable data would need to be taken into consideration at a later examination, and a practical dentist would naturally make such allowances. The absence of these data would not always mean lack of identity, for a reasonable allowance would need to be made for perishable dental features.

A chart is shown as an example, on which are recorded some of the peculiarities of an ordinary mouth according to this scheme.



(a) Round-square.
(b) 5.8 c.m.
(c) 2.5 c.m.
(d) Gum reddish pink; health line well marked; rugæ shallow and rather straight.
(e) Medium small.
(f) Rather wide and short; cusps low and rounded.

(g) Rich cream color; shading to yellowish at cervical border.
(h) Upper laterals both everted outward at mesial side; right lower central crowded inward.
(i) First right upper bicuspid and second left lower molar missing; first upper left molar broken off and roots remaining.
(j) 1, Gold contour filling; 2, large amalgam filling; 3, cement filling.
(k) 1, Deep decay; 2, shallow decay.
(l) Dead tooth with chronic abscess and fistula.
(m) 1, Gold tooth-crown; 2, porcelain and gold (Richmond) crown.
(o) 1, Third molar peg-shaped; 2, both lower bicuspids of tricuspid form; 3, whitish spot on labial face.

We would especially urge the value of dental characteristics for the purpose of identification upon life insurance companies, for, as before remarked, the teeth survive the destructive elements longer than any other tissues of the body. Such a chart could be included in the examination blank, which would need to be filled out by an expert, a practical dentist, by examination of the teeth of the applicant, and certified to by him. This would be very simple and effective. It would of course be kept on file in the office of the company, and in case of being required for purposes of identification, could be compared with the teeth of the supposed body of the individual by any competent dentist, who could certify to the identity of the description, or the reverse, with a larger percentage of probability than by the ordinary physical signs. There are so many variations of peculiarities of the teeth and of artificial operations upon them, that there is but a remote chance of the same case ever being exactly duplicated. Every practicing dentist can testify to that fact.

The history of life-insurance litigation demonstrates the value of imperishable physical data for the purpose of identification,—and these data the teeth furnish. It is more than probable that much expensive litigation and unfair decisions would have been avoided if these data had been heretofore utilized. In the celebrated Hillmon case, which dragged its slow length for fifteen years through the United States courts of the West, casts taken of the alleged corpse of Hillmon were placed in evidence which showed that the denture was perfect and regular, while the teeth of Hillmon himself were said to be irregular and one was lost. It was a case in which the body was disfigured so that evidence in regard to the teeth would have been of the utmost importance. If a chart of Hillmon's own teeth could have been produced which showed some of his dental peculiarities (missing teeth, irregularities, fillings, etc.), a comparison with the teeth of the corpse could have been made with advantage to all parties. Indeed, the case would have been soon justly settled and a tedious and expensive litigation avoided. A chart of Hillmon's teeth should have been incorporated in his examination blank, with the dental peculiarities noted, which could have been brought before the court, and there would have been little room for doubt as between his teeth and those of the corpse. Other cases have hung upon the lack of physical evidence, and much injustice has been done which could have been avoided by the data furnished by properly-charted dental peculiarities, which are so accessible and so easily noted with positive certainty, by ex-

pert observers. An extracted tooth or a filling in a certain position, or an irregular tooth (in adult age at least), or a dwarfed third molar or lateral, or a tricuspid lower bicuspid or upper molar, and many other features would remain always the same. Some indications are more or less transient, but many other signs of the teeth always remain unchanged for life.

These suggestions are incomplete and crude, for the subject is comparatively new, but a beginning should be made, and a little experience would soon open the way to a practical system of recording dental peculiarities. The evidence is so accessible and can be so readily utilized that we feel justified in urging the matter upon the attention of medical experts and others who may have charge of classes of persons of whom physical records are required.

PROCEEDINGS OF SOCIETIES.

First District Dental Society, State of New York.

The First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, November 10, 1896, at the New York Academy of Medicine, No. 17 West Forty-third street; the president, Dr. John I. Hart, in the chair.

Incidents of Office Practice.

Dr. F. Milton Smith. I have here an anomaly which may interest the gentlemen present. It is a second molar which I extracted several months ago from the mouth of a gentleman about fifty years of age. There was no history of serious trouble previously. I found the tooth split, and removed the pieces, one small and one large. The curiosity is that at the end of the root seems to be a stray bicuspid.

A little thing I have found in my practice to be useful, and that I never heard of any one having used before, is this: It is my practice in approximal cavities to use Abbey's soft gold at the cervical margins, as many of you do. I am careful in the use of the burnisher, especially in finishing very close to the surface, to avoid marring or injuring the cavity margins. For many years it has been my custom to take two or three strands of waxed floss silk after I had removed the matrix, running them through one at a time, and after getting them between the teeth twisting them very tightly and then drawing them back and forth with considerable force. I found that to act as an excellent burnisher in bringing down the soft gold. Following this experience, I happened to pick up in my office a piece of braided trout-line, and thinking it was much stronger than the silk and would not have to be twisted so much, I tried it for the purpose mentioned, and have since used it with much satisfaction.

Dr. Sidney S. Stowell, Pittsfield, Mass. I brought a lady to the city to-day to be operated on for an impacted superior right third molar. She has been suffering for two or three years with

facial neuralgia, has been treated by many physicians, and they had all given up the case in despair. She complained to me of her teeth, and I confess I was slow to guess the cause. I recently made a very careful examination, and suspected the presence of the impacted third molar, and by passing a probe through the tissues I was able to strike the enamel of the tooth, giving conclusive evidence that my diagnosis was correct. The tooth has come down through the porous bone, struck the hard plate, and glanced forward, so it is now butting directly against the roots of the second molar. I have frequently removed those teeth in my own practice, but this lady is a very sensitive person, and I concluded that she would be better satisfied if she had the operation done in New York. She will probably have to be anesthetized, the bone cut through, and the tooth removed, which will, I think, cure the neuralgia. These causes are often overlooked by physicians in the treatment of facial neuralgia. This lady has taken quantities of medicines prescribed by her physicians without relief. I have promised her a cure if she would undergo that simple operation.

Dr. Louis C. LeRoy. I should like to record a personal experience with cataphoresis. Recently I had occasion to have removed from one of my molars a filling which was a temporary one, and although the process of excavating was not very painful, the gentleman who performed the operation thought it advisable to apply the cataphoric principle so as to get rid of all sensitivity. It was done, and the gentleman said he had turned in seventeen volts, with the result that the anesthesia was not perfect even then. He said he had used a very light solution of cocain,—a one or two per cent. After excavation, the tooth was refilled with gutta-percha, and the filling with gold deferred. Subsequently there has developed a peculiar series of circumstances which would lead me to believe that the pulp is dying, and I have wondered whether electricity is performing the things ascribed to it in cataphoresis,—that is, permitting of painless dentistry. I hardly think it does, for the reason that I felt a severe shock when the electric current was increased, similar to the shock felt in turning on more electrical current into ordinary tissue. The pulp seems to contract upon itself (as muscular tissue does under similar influence), and it is impaired. The principle of cataphoresis, it seems to me, is to force a medicament into the tissues and anesthetize the pulp by the action of the cocain itself; it is really poisoning the tissues. Many of us object to using cocain hypodermatically, but may we not induce similar local sequences by forcing it into tooth-tissue by electricity? Judging by existing phenomena, I think the pulp of my tooth will die as a result of congestion. The operation was performed one month ago, and the trouble has been continuous since then. The day after the operation there developed facial neuralgia, which subsequently became quite acute,—an entirely new experience to me. I have never had any trouble with the tooth before. The filling which I had removed was of oxyphosphate. It was originally filled with gold, part of which had broken away, and one day, being very hard pressed, I put in the phosphate

filling, and it remained there for some time. The cause for the operation was a space between the teeth which annoyed me in mastication, the obliteration of which I thought would afford me relief. The gutta-percha has filled up the space between the teeth, and relieved me in that respect; but otherwise the condition is as I have explained. The cavity was fairly deep, but there had been very little disintegration of tissue since the original operation; no pulp-exposure at any time. In preparing for the new filling it was thought necessary to make additional retaining points. The gentleman is a very skilled operator, in whom I have great confidence.

Dr. LITTIG. Have you had the same gutta-percha in between the teeth all the time?

Dr. LEROY. There is no wedge of gutta-percha there. I can pass the silk through.

Dr. NASH. Would you not be apt to suspect that the pulp would be involved if you were treating a case with a similar history?

Dr. LEROY. No. I have followed the case with the gentleman who treated me, and I feel positive from the developments, particularly the prolonged inability to masticate upon the tooth, that it is really a poisoning of the pulp-tissue through the forcing of cocain or a medicament through the tubuli into the pulp. I do not hold the electricity entirely accountable, but the agent used, the cocain. In the comparatively short time that cataphoresis has been used, there are probably few dentists who have had occasion to subject themselves to a personal experience as I have done. I think it would be interesting to hear from others who have done so, and that much valuable information as to the action of cataphoresis could be obtained in this way.

The paper of the evening, entitled "Children's Teeth as Indicators of Disturbed Nutrition,"* was then read by Professor S. Henry Dessau.

Discussion.

Dr. A. BROTHERS, New York. I wish to thank you for the honor of permitting me to say a few words in regard to a subject which is as dear to the heart of the general practitioner of medicine as it must be to you who make a specialty of the care of the teeth. The question of disturbance of nutrition in infancy is one to which our attention has been attracted from time immemorial. Time was when every disturbance of infancy was attributed to disturbed dentition. Later the pendulum swung in the opposite direction, and a school developed which disclaimed any connection between dentition and nutrition. Among the followers of that school I may refer to such eminent men in this city as Professors A. Jacobi and J. Lewis Smith. The most recent aspect, however, is one midway between the two extremes. We have reached the stage of medical opinion where we regard dentition as a causative factor in many of the disturbances of nutrition, but at the same

*For the paper in full see page 199 of the current number.

time we recognize that most of the disturbances are due to other causes. I may refer to Rotch, of Boston, and to Henoch, of Berlin, as representing the latest views.

The question of the relationship between dentition and disturbances of nutrition has two aspects. In the first, we look for the effects on the general system of the child as caused by dentition. In the second place, we turn the problem squarely about and ask, "What effect has the disturbance of general nutrition on dentition?" It is the former class of cases which has caused the greatest variance of opinion in the medical profession, namely: the production of disease by difficult dentition. We know that dentition is a physiological process. We know that even in veterinary surgery. We know that there are animals born with teeth, like the lamb. The horse gets its first teeth a few weeks after birth. Still, many veterinary surgeons tell me that they find disturbances during the process of the eruption of these first or milk teeth, which are distinctly due to nerve-irritation. The careful observer in pediatrics, or diseases of childhood, meets with symptoms which can be fairly attributed to the eruption of a tooth. While we know that the gum itself is fairly supplied with blood, but poorly supplied with nerves, still there is no question but that some of the filaments of the inferior dental nerve may be irritated sufficiently to cause reflex disturbances. You will recall that the otic ganglion is connected with the carotid plexus above and with the inferior dental nerve below; so you may see that if the otic ganglion is disturbed you may have trouble in the ear from the teeth. Similarly do we go one step further and appreciate that many disturbances of the cerebral circulation can originate from disturbed dentition. Thus I have at times, in the absence of other causative factors, been inclined to the belief that certain cases of convulsions in childhood might really have their origin in difficult dentition. A child is very susceptible at this early period of life to reflex stimuli. It has been known that a child at the breast, biting the nipple of its mother, has, on the sudden cry of the mother, gone into a convulsion. It is simply reflex. Why could not the disturbance in cerebral circulation from difficult dentition be caused similarly? You all have seen in the eruption, perhaps, of the later teeth (we physicians see it more usually in the eruption of the first teeth) small pustules over the apex of the protruding tooth. We frequently see redness, heat, swelling of the gum. There is no question that we get oral irritation during this time. I, as a physician, must say that I know of no condition which is harder to diagnosticate than pain in the ear of a young infant. I have frequently erred in the diagnosis of such conditions. I do so at present, and I shall probably continue to do so. We are told to look for a leaning of the head to one side, and that the child puts its little hand to its ear; but either we do not notice those things, or the child does not happen to do it at the time we are there. We notice that the child is restless and peevish and crying, and the mother or nurse says it cannot be kept quiet at night. It may have a little fever, and the grandmother usually says "the

colic," or sometimes "the teeth." While we generally poke fun at her for her diagnosis of "the teeth," we must sometimes admit that she is right. I believe there are many cases of oral irritation in which there is no discharge, which owe their origin to the irritation of the inferior dental nerve and to conditions which we do not appreciate.

Now, per contra, we have the proposition of how a general disturbance of nutrition affects dentition. You have, from the masterly essay read before you to-night, learned of one of the most potent factors in producing such disturbed dentition. The author was kind enough to mention some work which I did some years ago, when head of a large clinic for diseases of children at Bellevue Hospital. At that time I had my assistants take careful notes of every teething child that came under notice, and we kept records of about five hundred children in that manner. From a study of those notes I arrived at a number of conclusions. One of the first conclusions that impressed me from that study, and which has continued to be my impression ever since, is that dentition, *per se*, does not kill. It may seem to you strange that I should make such a broad statement, for you probably all know that dentition is recognized as a cause of death. West, in London, some ten years ago, attributed four per cent. of the deaths of infants under one year of age to dentition, and seven per cent. of the deaths of all children between twelve months and three years to the same cause. The various cities in this country permit of the diagnosis of dentition as a cause of death, and in New York the diagnosis is permitted on condition that additional conditions present at the time be noted. I have done a fair amount of work in children's diseases. I have cured or killed as many as the average practitioner; but I have never put down dentition as a cause of death, because I have usually found other causes sufficient to cause death in the little ones that died. I say that advisedly and after careful consideration of the subject.

As regards the deviations from the normal: I made a careful study of about one hundred cases. I shall not enter into details, because the subject is very interesting in some aspects, but tedious in others. I found that six and one-half months was the average period of dentition. I found that dentition was at times precocious and at times retarded, and without being due to disease; and that is an important factor to bear in mind. The fact that the child gets its first teeth when it is four months old, or does not get them until ten months, is not always a sign of inherited syphilis. I have found in children of healthy families precocious dentition, and in others retarded cases. As a rule, however, there is something at fault. As Professor Dessau has pointed out, there is usually some disturbance of the general nutrition which modifies the eruption of the first teeth. The first teeth usually appear in the lower jaw, but in many of my cases the first teeth appeared in the upper jaw; but this is not pathological. These were mostly among the poorer classes, who do not get as much sunshine as they should have, and, as Dr. Dessau says, they ought to have.

As to the conditions which follow artificial dieting of children or mixed dieting: Some children, from the earliest months, receive the breast, but in addition they receive artificial foods, a little here and there from the table, or an extra bottle, as the doctor or grandmother may advise. Others, through the death of the mother, or some other cause, are obliged to be put on the bottle at once, and a sorry lot those poor little ones are if they have to be fed on artificial foods at once. We usually find dentition retarded in their cases. As was pointed out in the paper to-night, this mixed or insufficient or inappropriate diet is responsible for that most frequent condition found among the children of the poor, and occasionally among the children of the rich—rickets. In rickets the average delay, in my experience, was four months beyond the normal time. The first teeth were retarded to about ten and one-half months, instead of appearing at six and one-half months. The later eruption of the other teeth was similarly retarded. Chronic conditions show generally a retardation in the later teeth, but as the professor pointed out, I find that in conditions like marasmus the first teeth were usually precocious. The later teeth even in these cases were precocious. In delayed mental development or chronic cerebral conditions the process of dentition was regularly delayed. I point out the two classes of cases for this reason: I have always been a strong believer in the hope that dentistry would some time be an active part of medicine. I hope to live to see the day when that will be an accomplished fact, and nothing will bring me nearer to that view than the paper read to-night, which shows how futile it is to regard the troubles of teeth as local conditions. You had pointed out to you how irregularity in the teething process may simply be an evidence of some general condition proceeding from general pathological causes connected with the practice of general medicine. You have been taught how many of the pathological conditions or deviations occurring in the first and second eruption of teeth owe their origin to general systemic disturbances. In the first set of cases in which the system is disturbed by local processes we call upon you, as dentists, or we, as physicians, take the lancet and cut the gums. In the second case it is your duty to call upon us, and have us treat and cure the general condition. I hope the time will come when the science of dentistry will occupy the same position toward general medicine that we have at present occupied by the various subdivisions,—orthopedic surgery, obstetrics, pediatrics, etc. You have just as much right to be physicians and to know what the general underlying conditions are in your profession, as we have to know what the treatment of such conditions is, after pointing out the general underlying causes.

Dr. J. F. P. Hodson. I am afraid I have been misapprehending the request of the president and the synopsis sent me of the paper just read, in supposing that I was writing an auxiliary paper. This may excuse to you its length and, I hope, secure for me your generous patience.

I shall speak on the subject from the standpoint of the dental

practitioner, whose observations are limited to such cases as present for treatment of conditions resultant of disease.

In some sense the discussion of the excellent paper that Professor Dessau has given us seems to me a work of supererogation. The consequences upon the teeth of deranged nutrition of the system, which is of so inherent a quality as is rickets, are matters that appeal to my mind more from the standpoint of satisfaction of curiosity than as being of the slightest value to me in either the treatment of those consequences, on the one hand, or the ability to anticipate the rickets, on the other. That is to say, I am in such case making a diagnosis upon present consequences of a dead and past condition, and that condition itself is not a cause, but an effect. Moreover, the crowns of the teeth, which are the parts whose quality is most affected,—and the parts whose poor quality so tries our souls,—are fully formed long before they appear through the gums, and for good or ill that quality is defined long before we see them. The rickets has had its influence upon them, and through the developing changes of the general system has probably passed, leaving the system again in more or less normal working; but the teeth formed under the rachitic *régime* never partake of the greatly bettered conditions governing the rest of the system. So I repeat that this knowledge and this diagnosis, that rickets was the cause of the deplorable state of the teeth before me, is merely matter of curiosity, and of no applicable value whatever. It is a dead issue by the time it gets to me. In the case, however, of a tangible, treatable diseased condition like, for instance, syphilis, of course the whole case would be changed completely, and indications of and upon the teeth be of great diagnostic value as pointing to treatment of a present, live, continuing condition.

Very many years ago I was possessed with the idea that the poor quality of the teeth of the period was directly attributable to deficiency of the lime-salts in their structure, and this to the fact that in the effort to produce the most refined white flour all the lime-salts, being stored near the surface of the cereals, were bolted away in the process. My old friend, the late Professor H. B. Sands, took up the same line of work with reference to the general osseous system. The exhaustive series of experiments which we separately instituted proved beyond question that, leaving out entirely all the special so-called bone-producers,—the cereals,—there still existed in ordinary foods more of the lime-salts than any system ever employed. We were able to recover from the excretions abundance of lime-salts in every case, and the more or less definite recovery of those which had been administered medicinally proved that there had been no appropriation of them by the system's action.

During the course of all this work and experimenting I conceived what I felt to be a brilliant idea, that our results were *nil* because we had been working upon more or less completed organizations. I would go back to the fountain-head. So, during the whole period of gestation I fed the mother persistently upon the

different whole cereal grains, thinking to thus store in her system a great fund of the lime-salts for the fetus to draw upon during fetal life, and also to continue the process after birth, through the mother's milk, during the many months of nursing. All in vain. I applied the principles and practice carefully to my own children, with the discouraging result that their teeth are of exceedingly poor quality. The conclusion to which I was finally forced to arrive was that it was *not* a question of *alimentation* at all, but of *assimilation*. That is the word which is the keynote of all depraved nutrition and its consequences. With good assimilation we would have proper marriage between the so-called animal and mineral constituents of the teeth, resulting in the "tough" structure so resistive of decay. With good assimilation, perfect health in the general system and resistance to disease and its germs; dread consumption even would find no soil for its germs if non-assimilation did not make it. Non-assimilation is, in one way or another, the inviting if not the producing cause of all our bodily woes. How to combat this condition of non-assimilation in the system—this disinclination of the vital forces to touch the working processes with their magic spark? Ah, if we only and surely could! We would then be physicians indeed, and in a fair way to produce immortals with our skill. For myself, I feel little or no confidence in any system of unassisted medication in these premises. Anything which will overturn the system, so to speak, completely change or break up the existing order of things in it, and so wake up to renewed life and activity the dormant processes, seems to me a *sine qua non*, as because of this slumbering of *all* the processes none of them can be appealed to to come to the assistance of others, as is done with ordinary diseases through medication.

Oftentimes the overturn is a spontaneous one, through the system's own operations as it grows from infancy to young manhood. In women it is not uncommon to see it consequent upon marriage and maternity. A visitation of typhoid fever is usually followed by such an access of energy in the building-up processes as to result in the placing of that system permanently upon a higher plane than ever before. In a case of persistent anemia in my own family the patient was dosed with everything, and for long periods, so absolutely without results as that the physicians were wholly discouraged, and assured me that medicine or medicated nutrition were all proven of no value in the case, and they must give that all up. I conceived that if I could administer a thorough and long-continued dose of sea-sickness to the case, and follow this up with a temporary change of climate, I could so wake up the vital processes through the digestive system as to effect a cure of the anemic condition, and I did. And this leads me to say what is really the essence of all I started to say, that I am persuaded that the most potent factor—so potent that all others without it are of little value—in this necessary fundamental change in all the system's operations is complete change of climate and surroundings,—diet, manner of living—everything, in a word,—placing the system, in all its phases, in a totally different environment.

In fact, and finally, in the treatment of deranged nutrition and its consequences, while I fully believe that both medication and change of environment have each their place in judicious combination in the entire scheme of treatment, I am decidedly of the opinion that as between the two employed separately the former weighs a feather and the latter a ton.

Dr. M. L. Rhein. The paper is one that should interest every dental specialist, and certainly none of us who have had any experience can take exception to the statement that a certain percentage of cases of dental irritation do produce reflex disturbances. To my mind, however, the number of these reflex disturbances that are related to dental irritation is small. They are not nearly as numerous as we were apt to think in the past, and yet they come up frequently enough to make them well-marked examples of troubles that originate distinctively from dental irritation. There is, however, the other side of the question,—the effect of malnutrition on the dental organs, a condition of affairs in which the dentist requires instruction. There is no doubt but that malnutrition, from the very birth of the child until death itself, plays an important rôle in regard to the health or disease of the dental organs and the surrounding tissues. This subject is one in which I may perhaps be pardoned for being a little dogmatic, because I have probably given the subject more study than any other portion of my daily work. I have taken some pains to illustrate at various times the effects of malnutrition upon the dental organs, in whatever form that malnutrition may proceed, and to give the reason why the very first effects of malnutrition are to be found around the dental organs before they manifest themselves in any other part of the body. This is a point on which, perhaps, the general medical practitioner may well learn something from us. It is easy to perceive that the blood circulating through the body has a certain amount of nutritive media, which becomes lessened in quantity as the blood reaches the farthest anatomical points. When there is a deficiency in this medium, the portions around the teeth—the gums and the teeth themselves—are the first to receive the detrimental effect of a lack of nutrition in the circulation. The tooth trouble that is so well marked in pregnancy is as noted and marked an example illustrative of this point as any that we may have. There is no reason why this rule should not hold in childhood as in later life. In later life we get its effect in the pericemental tissue, in the gums, in the various forms of pyorrhea alveolaris; while in the child we have the effect upon the tooth-structure itself, because at that age the tooth is not thoroughly formed, and is still liable to be affected at any time by any interference in the nutritional tract. In this respect I must differ very materially with the remarks of the last speaker, and I think it is an equivocation,—the difference which he makes between nutrition and assimilation. The author of the paper and the subsequent speaker very beautifully brought in the point that perfect nutrition, as we understand it, means perfect assimilation. We do not, when we speak of perfect nutrition, mean the inception of food and

its passage through the alimentary tract, but we refer to all those chemical transformations which are necessary for the food-stuffs.

Dr. HODSON. I said alimentation, not nutrition.

Dr. RHEIN. Then I misunderstood you. The point I wished to make was, the fact that the excrements show an abundance of lime-salts, of phosphates, of all that is necessary to make good osseous structure, does not prove that the child is not fed properly and is not suffering from malnutrition. The worst forms of malnutrition that I have met have resulted from over-feeding, and in that I also agree with the author of the paper, generally, that over-feeding consists in foods that lack the kind of material which the child ought to have. What benefit is it to the child if it gets so much food that the circulation of necessity takes up the more easily digested foods, and those that are less easily digested are passed through without being taken into the circulation? I merely throw out this little suggestion in view of the point of the last speaker that he could not see any relevancy that an attack of rachitis might have to the dentist. I differ entirely with him there. When a child with rachitis presents itself to us with the teeth in that condition, the first consideration in the treatment of the patient, whether we are able to aid him by mechanical means, as we sometimes are, or by consultation with the physician of the patient, should be the altering of that child's condition so that nutrition may properly proceed. One of the prime considerations is that the food-stuffs which the child receives should be of a proper nature. In illustration of this fact, a very interesting case presented itself to me this week. A young lady about twenty-two years of age came into my office with a specialist in pediatrics. He introduced her to me as a patient who had been under my care about ten years ago. I saw her originally in 1885, and treated her for irregularity. It was a case of protrusion of the lower maxilla, which became amenable to treatment very readily. It required only two months to bring about a normal occlusion. What interested me at that time, and it was refreshed in my mind by looking up my notes, was the fact that I at once noticed in the patient a decided tendency to rachitis, and I attributed to this condition the ease with which this very bad case of irregularity was so readily cured. The first permanent molars had been removed from the patient before I saw her, so that when her teeth were brought into proper occlusion she had really no masticating surface to get any benefit from. I had at that time a very serious conversation with her mother, telling her that the child was in a very precarious condition; that it mattered little what form of food she took, it was impossible for proper nutrition to proceed unless some measures were taken to improve that condition. The mother was of a very penurious nature, and she paid just so much attention to that conversation that I never saw the case again until the other day, when I found that the child had been undergoing a course of treatment for the past two or three years for spinal disease and various other osseous troubles, due entirely to the effects upon her system of this condition of rachitis, which was so marked at the

time I saw her, ten years ago, that I could not help warning the mother of the case.

I bring this up as a most interesting example of what rachitis has to do with the dentist if he does his duty by the patient. Here is a case where a dentist originally did a great deal of damage to this child by removing the first permanent molars, that were very likely badly decayed, but which should have been preserved at every hazard for the purpose of mastication, so that that child could perform the initial stage of nutrition properly. It is this initial stage of mastication that the general practitioner too often loses sight of,—the absolute necessity that it should be properly performed if the succeeding stages of chemical transformation are to be properly brought about. The author brought out one point about retarded dentition. I disagree decidedly with him in the conclusions that he reaches. He said that where dentition was retarded he would expect such cases as rachitis. This is not in accord with my experience, nor with the statistics that I have gathered on the subject. It is still a mooted question; but one thing in reference thereto is very evident,—that the time of dentition varies greatly, according to individual types and individual families, just as the time of puberty varies in different nationalities, in different families, and in different members of the same family. It has nothing to do with the amount of nutrition, or with any resulting diseases. Personally, I never attribute it to anything of the kind; on the contrary, where I have noticed a difference in the period of dentition in children of the same family I have reached absolutely the opposite conclusion,—that is, that the child in whom the teeth come in the easiest and the quickest is by all means the weakest and the most prone to rachitis and kindred affections, while those where dentition occurs at a later period are stronger and heartier. I think in these cases our statistics are more reliable than those that are gathered in hospitals and clinics from cases of children that come from poor families, where it is difficult to get the average which you would get in general practice. There is only one other point that I wanted to dwell on, and that is, that in these very cases any effects of malnutrition that are marked on the newly-formed deciduous tooth are necessarily due to the effects that have been produced on the mother, and not on the children. As far as dentists are concerned, the Hutchinson notch which the author spoke of is something that very little stock is taken in at the present day by the best stomatologists. It is a form of diagnosis that has been pretty much relegated to past eras.

Dr. L. Ashley Faught, Philadelphia. In the limited remarks that it is my privilege to present to you this evening I cannot undertake to discuss, as it merits, the highly instructive and interesting paper to which you have just listened. My only regret is, that I could not be present and have heard it in its entirety. I shall content myself by presenting a few kindred thoughts.

Dentists have ever recognized that children's teeth are indicators of disturbed nutrition, but the knowledge leads to general rather than to specific application in the care of cases,—that is, the indi-

cations by the teeth of disturbed nutrition come so long after the occurrence of the condition, that in the special case we are more called upon to combat the ravages resultant rather than to contend with the original causative condition; but in time we apply the lessons learned to the next case of disturbed nutrition, knowing that our treatment will benefit the child in after-years and do much to lessen then the indications of the conditions now existing. We are therefore to fix firmly in our minds that we have to deal mainly with the formative periods of the teeth. The conditions, therefore, are the reverse of those which come to us in more mature life. There the enamel, so largely inorganic, has become a fixed quantity, which we can influence but little, our efforts being directed toward the dentin. Here our efforts can go in the line of the greatest need to make a strong enamel. During the formative period we can do much to stay the ravages of disease by supplying the materials of nutrition and controlling assimilation, and build up a comparatively sound, solid enamel structure which shall late in life stand as a bulwark against the destruction of the precious organs. We must not forget that the teeth are integral parts of the organism and governed by the same laws that control diseased action in other portions of the economy; and therefore, as suggested by the distinguished essayist, we should look to the control of predisposing conditions of disease as well as to the treatment of the disease itself.

Prevention of the conditions leading to the production of rickets should be recognized by the dentist. Some cases, indeed, seem to be hereditary, their origin most probably due to strumous, syphilitic, or scorbutic conditions of the system, or influenced by environment,—damp, ill-ventilated places; but the most unquestionable cause is an impoverished state of the blood and defective nutrition; and if we are to hope for an enamel without a roughened and pitted appearance, without fissures in the bicuspids reaching nearly to the dentin, and a dentin beneath in which we can feel confident of the absence of interglobular spaces, it is to the correction of these predisposing causes we are to look. Proper food in proper quantity, proper times of ingestion, proper exercise, proper rest, plenty of sunshine and fresh air, are the indicated lines of treatment.

Dr. C. G. Pease. In the matter of the decay of teeth as indicative of malnutrition, I think that a faulty structure is not the only cause, and that there is a cause lying beyond,—the fermentation of food. Have we not vitiated fluids as a result of the perversion of the secretion of the mucous glands, and of the impaired quality of the saliva? We surely have these as factors in the breaking down of the tooth-structure and as a cause of the excessive fermentative condition of the mouth. Besides the proper food, the sunlight and the oxygen spoken of by the essayist, in the treating of the patient we should see that the nerve-force is not in any way being interfered with or deranged or wasted. The first essential force in nutrition is that supplied by the nervous system. A derangement of that would, of course, mean faulty nutrition. Over-study at

school, eye-strain or other defects, such as phimosis particularly, will produce derangement of the nervous system, and we find a resulting malnutrition, to a greater or less extent. This is largely overlooked by physicians, and finds no place in the paper of this evening. The paper gives us fresh food for thought, and we should make a closer study of the conditions.

Dr. Stowell. The subject has been so ably presented by the essayist and by the gentlemen present that there is little left for me to say. It seems to me we can now sum the matter up in a few words in this wise: that when we as a people, as fathers and mothers, cease to wander from the true heart of nature, cease to please the eye and the palate in the selection of our food; when we can abandon the whimsical fancies which govern the selection of our diet, and when we can act as intelligently as a people so highly educated as we are should act in making wise selections of food that will sufficiently nourish all tissues of the body alike, then, as we come back to the true heart of nature, we shall be healthy, wealthy, and wise.

Dr. Henry D. Hatch. There has been one thing touched upon to-night that I have had a little experience with, and I want to relate it. I have been saturated with this idea of the feeding of pregnant women, and starting right, if we are going to have good teeth in the child. I took occasion to advise two such women as to their diet, and advised them as best I could as to the selection of their food, and they followed it out faithfully, as I had reason to know, with the result that in one of those cases when the woman came to term it was a forceps delivery; the head of the child was very large and the bones were very firm. The sutures were closed and fontanelles ossified, as they should have been only at the age of six months. There was no yielding of the bones of the cranium, and as a result the skull was fractured and the child died. The other was also a forceps delivery and tedious labor. That caused me to think that perhaps the course of treating the mother with bone-forming food might be right, but we, *as dentists*, should not undertake it, and it should be left entirely to the physician in charge, the obstetrician. He alone knows the conditions, pelvic diameters, etc., and he alone should have the control of the mother and the advising as to her food and her way of living during her state of pregnancy. I mention this because we hear so much about advising expectant mothers so the child may have a perfect set of teeth. Teeth are a good thing, but when it comes to teeth *versus* the life of the child and perhaps the life of the mother, teeth are not to be considered. We should be stomatologists in the broadest sense of the word, and so qualified in it that we should not need advice from the general practitioner.

Professor Dessau. I certainly must thank the society for the compliment they have paid me in the able discussion which has followed my paper. In the early part of my paper I said that the practitioner of medicine and the dentist, when they come together, should be willing to learn from each other, and I certainly have learned considerable here this evening.

There were some points that I noted down, but they were answered by other gentlemen in the course of the discussion. In regard to some points made by Dr. Brothers: Of course I agree with him—all physicians will—that these reflex disturbances are very common results of irritation of the nerve-filaments of the gum in dentition, etc. The doctor is very well up in that branch, but I did not refer to anything like it in my paper; I simply wanted to refer to the influence of disturbed nutrition in its broadest sense, not only in regard to the question of food, whether it was artificial diet or mixed diet, but also in regard to plenty of oxygen in the tissues,—the complete assimilation of the food, as has been referred to in the course of the discussion,—the burning up, as it were, of everything that went to the healthy growth of the tissues of the entire body, and, besides that, the influence of sunlight. As far as we know (as physicians), this is almost as important as the proper quality of food. As Dr. Rhein mentioned, there should not be too much food—not a surplus.

The main object of my paper, as a physician bringing it before a dental body, was, as I said before, to get some information upon the subject myself. I know the subject has not been thoroughly exhausted. Physicians see these cases of delayed dentition in children, and they see cases of early decay, not only in infants, but after the permanent teeth have made their appearance also, and they think that they are able to discover that these signs point to some other condition,—not only rachitis, but other diseases of disturbed nutrition. What the physician expects from the dentist is that he will explain *how it is* that this early decay takes place. I would like to have heard that question discussed more largely.

A vote of thanks was extended to the essayist and to the gentlemen who took part in the discussion.

Adjourned. B. C. Nash, *Secretary.*

The First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, December 8, 1896, at the New York Academy of Medicine, No. 17 West Forty-third street; the president, Dr. John I. Hart, in the chair.

Incidents of Office Practice.

Dr. John H. Meyer. I have here the models of a case of extreme protrusion of the upper teeth, which I wish to bring to the attention of the society and to get some opinions as to what would be the easiest way of correcting the deformity. The lower incisors strike directly on the upper gums when the teeth are brought in occlusion. The patient is a young man aged twenty-one.

The President. While these models are being examined, I will request that any other incidents of office practice be offered.

Dr. F. Milton Smith. I have a case that bothers me a little, to know just what to do. It is a lower third molar, the only molar on that side of the jaw, which I am extremely anxious to save in order to utilize it for an abutment for a bridge to the bicuspid. Unfor-

tunately, the third molar is completely encircled by decay and extremely sensitive. I would like any suggestion as to what could be done under those circumstances.

Dr J. F. P. Hodson. I think it would be advisable to cap it with a gold encircling cap, which need not necessarily have a top to it.

Dr. F. L. Stanton. I would suggest the capping of the tooth and the swaging of another crown to accurately fit the first, cutting out the occluding surface of the outer crown so there would not be too much thickness.

Dr. S. Freeman. If the decay does not extend deeply, I would advise treatment with nitrate of silver; but if the contrary I would unhesitatingly recommend devitalization of the pulp and its removal before crowning the tooth. I would then adapt a small plate after the Bonwill system.

Dr. Smith. I am grateful for the suggestions. I incline very much to Dr. Freeman's idea. My experience with such teeth where I had adjusted crowns without previously devitalizing the pulp, fitting them as accurately as I was able to do, and attaching them with cement, has been that in the course of a few years the cement dissolved out and the patient returned with a terrific toothache. When they served as anchorages for bridges the situation was extremely annoying.

Dr. W. Irving Thayer. If Dr. Smith will extract that tooth he can obtain direct access to the pulp-canal by making a coronal opening, and then with a Donaldson nerve-bristle No. 3, with a smooth shank, he can fill those roots. I would guarantee to fill every pulp-canal inside of half an hour. While the tooth was out of the head, I would take it to my grinding lathe and make parallel walls. I would then replace it in the patient's mouth. It would be sore for about ten days, and after that it would be all right. I have perhaps twenty molars that I have treated that way. They have been in five or six years, and are as firm as they can be.

Dr. Louis C. LeRoy. I think the best results would be obtained from a removable bridge, after crowning the tooth.

Dr. Smith. I have no doubt that under certain conditions Dr. Thayer's treatment might be the proper thing, but with this case I should hesitate to adopt it, because nearly twenty years ago I extracted the third molar on the other side of the mouth, and the root being bent I did considerable damage to the process. I believe this tooth can be saved without extraction, and am unwilling to take unnecessary risk.

Dr. James G. Palmer. I am opposed to the devitalization of any tooth unless it is absolutely necessary. I want to ask whether an entire cap or band might not, even with deep-seated decay, cover it so nicely that the decay would be arrested and the tooth preserved alive, in all probability. Dr. LeRoy's idea of adjusting a removable piece over that cap or band would not injure the tooth at all, and would probably be the best way of supplying the needs of the case.

Dr. LeRoy. My practice is after removing the decay to line the

cavity with chloro-percha, using oxyphosphate to attach the band or crowns. We all know the action of oxyphosphate on vital tooth-structure, the moisture there allowing of chemical change which in time would result in a devitalized pulp, as has been the reported experience of many. That has been my experience, and I no longer place oxyphosphate over sensitive dentin without first insulating it by a covering of chloro-percha. I might do it in some instances where the tooth is quite advanced in the process of calcification, where the patient may be past forty or fifty years of age, and the decay not deep-seated; but those are rarities, and even in such instances I take the precaution generally to put chloro-percha at the base of the cavity.

The PRESIDENT. We would now like to hear from some of the gentlemen as to the model of Dr. Meyer's which has been passed around.

Dr. MEYER. I thought of putting in a plate and opening the bite so as to allow the back teeth to elongate; but I suppose that would take several years. I would be glad to hear any suggestions.

Dr. DWIGHT L. HUBBARD. May I be allowed to say a word that might be of interest? I know very little about the regulation of Dr. Meyer's case, except from a surgical standpoint. If it were a case of fifteen or sixteen years I would do a surgical operation. In the pharyngeal vault there is probably an adenoid growth which obstructs the nasal breathing. He undoubtedly has large tonsils, and if they are removed, and the vault cleaned out so as to give full nasal breathing, you will find that the facial muscles will relax in about two years' time, and the muscles not only of facial expression but of mastication as well will be so relaxed as to allow the lower incisors to come forward and relieve the bite from the upper gum. It might be done in this case, although it is beyond the age at which this is usually done.

The paper of the evening was then read by Dr. S. FREEMAN, of New York, who said by way of introduction,—

There are certain portions of this paper which I read before the American Dental Association in 1895, and I have been requested to repeat an essay on this subject before the society this evening.

THE USE OF COMPRESSED AIR IN OPERATIVE DENTISTRY.

Every workman, in the exercise of his art, should be provided with proper implements. For the fabrication of complicated and curious pieces of mechanism the artisan requires a corresponding assortment of various tools and instruments. For giving proper effect to the fictions of drama, the actor should have at his disposal a well-furnished wardrobe, supplying the costumes best suited to the personage he is to represent. For the perfect delineation of the beauties of nature, the painter should have within reach of his pencil every variety and combination of hues and tints.

Now, the dentist, who is called upon to treat and relieve the pain of such delicate and sensitive structures as the teeth, which bear an intimate anatomical and physiological relation to some of the most

important organs of the body, should naturally look forward to that which can assist him in the practice of his profession. It is therefore essential to his success that he be provided with all the necessary appliances which will aid him in his operations and mitigate the sufferings of his patients.

With this aim in view, no procedure appears to me to be more conducive to success than the application of compressed air, an agent which I employ extensively in operative dentistry, and it affords me great pleasure to call your attention to the divers instruments which are used, and the application of which I will explain and demonstrate in detail.

Permit me to explain the methods of producing compressed air and the manner of conducting the same to the operating-chair.

It is obtained by means of a suction pump which sucks in the air and forces it through a pipe to a reservoir, as it is necessary for our purpose to have a continuous and considerable current. I would not advise the use of a hand pump or small cylinder, as in employing them you will find that both the air and the operator become quickly exhausted. I would therefore recommend that which is known as the champion beer pump or the compound pump of the same manufacture, for I find them both the simplest in construction as well as the most satisfactory air compressors on the market to-day.

Before placing the pump in your office, ascertain how many pounds of water pressure you have; if, as in my office, you have only twenty-five pounds, the champion pump will not furnish, contrary to the claim of the manufacturers, the same amount of air pressure as water, as there is, as I have discovered, a loss of a few pounds; such being the case, the compound pump (although a few pounds of pressure are also lost) is preferable, as it is frequently necessary to have the air at a pressure of forty to fifty pounds to the square inch.

This pump is connected with the reservoir, which is a tank containing eighteen gallons of air tested to one hundred and fifty pounds pressure to the square inch; from this runs a quarter of an inch block-tin pipe with branches to my laboratory and operating room; to this pipe I have attached a regulator and a gauge, the regulator being nothing more than a screw valve—as you loosen the screw you close the valve, and *vice versa.*

From the regulator a pipe leads to the gauge, which indicates the number of pounds pressure.

I use the one hundred-pound gauge, as it enables me to ascertain the maximum amount of pressure in my office.

The pressure generated by the compound pump is sometimes so great that a lower gauge will not register it.

To the gauge is connected a distributing pipe with three small cocks to attach the rubber tubes and the cut-off. The tubes should be of heavy rubber so as to withstand a high air pressure. The cut-offs close automatically, and you may use the somewhat antiquated expression—touch the button and the air will do the rest.

Before proceeding to explain my other devices, permit me to

call your attention to this pump which I am enabled to present to you through the kindness of Mr. Hoffman, manager of the Cleveland Faucet Company; he has sent this complete apparatus here, which permits me to demonstrate the action of compressed air.

These pumps are a part of one of the best hydraulic atomizing outfits that I am aware of.

I use the word hydraulic to designate the method in which the air is compressed, for you have single, double, and rotary hand pumps. When you are unable to procure water, the rotary pump attached to an electric motor is preferable.

In the practice of dentistry it is absolutely necessary to have the mouth in an aseptic condition; to produce this effect no doubt many of you use the hand atomizer, which, by the continuous pressure of the bulb, causes a slight cramp in the hand; with the compressed-air apparatus we do away with this work, you have the tube steadied, and can thoroughly cleanse the mouth or any cavity. I derive excellent results from the following prescription:

℞—Borine, 1 part;
Pyrozone med., 3 per cent., 2 parts;
Water, 1 part.

This makes an agreeable mouth-wash applied with a spray.

No doubt you have frequently met cases where you would prefer to place on the rubber-dam, but owing to the patient's inability to breathe through the nostrils have been compelled to send your patient away or otherwise work at a great disadvantage.

How often have you cast about for a remedy? It is a simple one, —a two per cent. solution of cocain placed in an atomizer attached to the compressed-air apparatus, which is gauged at ten to fifteen pounds pressure, and the spray thrown into the nostrils will invariably relieve that posterior nasal catarrh or reduce the swollen tissues of the nares to such an extent that you can proceed with your work in a few minutes without any inconvenience to your patient. In using the spray for this purpose, have your patient sitting upright in the chair, the head inclined slightly forward. Insert the tube horizontally into the nares and do not apply over ten to fifteen pounds of air pressure, as otherwise you may set up an irritation of the middle ear.

Where we have nausea arising from taking impressions, placing on the rubber-dam or even during pregnancy, a two per cent. solution of cocain blown directly up the nostrils, so as to have the fluid in contact with the olfactory nerves, will often relieve the severest case of retching. In using the spray in the nostrils, you must not permit your patients to blow the nose for several minutes, otherwise the fluid may be blown into the middle ear, and subsequent irritation arise.

In stomatitis of the various kinds, the spray employed with a high pressure produces excellent results.

In aphthous stomatitis, which usually requires about a week to ten days to heal, I have succeeded in obtaining a cure in two days.

Probably the citation of the following case will enable you to better understand the value of this agent.

Mr. H., age seventeen years, applied to me for treatment May 7, 1895, suffering from large grayish patches, situated on the lower and upper lips. These patches were very painful; I applied the following prescription:

℞—Pyrozone med., 3 per cent., ℥ii;
Borine, ℥i,

with my atomizer under forty pounds pressure; in about two minutes it produced bleeding of the sores, washing away the grayish patch, and you could see the ebullition of the pyrozone, leaving escharotic spots similar to those produced by the application of the caustic pyrozone. I gave the patient the mouth-wash recommended by Dr. Sudduth, of pyrozone and soda mint; the patient reported on the ninth day of May having no signs of the patches. This method of treatment was not painful and proved very efficient, as I have used it in similar cases with uniformly good results.

A patient affected with mercurial stomatitis presented himself to me on June 5, 1895. I found the characteristic lesion of the edges of the gums with considerable ptyalism, which excoriated the corners of the mouth, and was informed by the patient's physician that some time previous to the appearance of this disease the patient had been taking a sixteenth to an eighth of a grain of biniodid of mercury, three times a day, for three months, and during this medication he would discontinue the use of the drug as soon as the teeth were sore to the touch. He was having his teeth attended to by a fellow-practitioner, who, having learned his condition, upon the appearance of this lesion treated the parts locally with glycerol of tannin and iodin, using as a mouth-wash listerine. After treating the case for three weeks without success, he concluded that it was secondary syphilis, and sent him to his physician for treatment. The physician, recognizing the condition as a mercurial stomatitis, referred the patient to me. I used the pyrozone med. three per cent. on the diseased parts with a spray gauged at thirty pounds pressure, and gave him for a mouth-wash—

Pyrozone med., 3 per cent.,
Borine, equal parts.

When the patient applied to me, he could not eat his food without pain; the next day he reported, stating that it was the first time in some weeks that he enjoyed eating a meal. After three treatments with the pressure increased to fifty pounds, I found a decided improvement in the condition of the mouth.

The sloughing of the edges of the gum disappeared after the first treatment, and in four days the gums were in quite a healthy condition. The patient was called away from the city, but informed me shortly afterward that the tissues were perfectly healthy.

Before applying any medicines to the gums it is always necessary to have a dry surface, so that the medicament may be readily absorbed and not distribute itself over the surface of the tissue.

I found it somewhat difficult to obtain a dry condition of the gums in the posterior portion of the mouth before employing this apparatus.

Now I find it a very simple matter. By drawing back the corners of the mouth with a napkin or piece of cottonoid, and throwing the compressed air directly to the spot, it only requires a few seconds to procure the desired condition of the mucosa, and upon applying your medicines you get immediate absorption.

Now, I again have recourse to the air pressure, which seems to drive the medicines deep into the tissues.

In periostitis I prefer to use the cold-air current, which in itself gives relief to the patient.

In this manner the application of counter-irritants, sedatives, and local anesthetics is made easy. With cocain you do not obtain as deep an anesthesia as you do by the hypodermic injection of the drug, but with a four per cent. solution I was enabled to lance abscesses within twenty to thirty seconds without pain.

In reference to the treatment of disease of the antrum I will repeat the words of Dr. Frank Abbott, in a paper read before the New York Odontological Society, November 20, 1888:

"Here I wish to remark that my first idea of the use of a spray as a more perfect means of medicating the antrum was obtained from Dr. J. L. Mewborn, of Memphis, in 1884. He, however, uses the remedy warm, and applies it by means of a hand atomizer with a single jet. I use compressed air with a pressure of thirty to forty-five pounds to a square inch and a multiple spray. The pressure forces the remedy into every irregularity of mucous membrane, and the multiple spray reaches all parts of the cavity. This mode of applying remedies to the cavity of the antrum I consider of incalculable service in the successful treatment of many cases."

No doubt the report of an interesting case of disease of the antrum will not be amiss, and will thoroughly explain the method of treatment:

Miss M., aged fourteen years, applied to me for treatment on May 7, 1896. Upon examination I found an irritation of the gum between the second superior left bicuspid and first molar, caused by a piece of wooden toothpick which she was unable to dislodge. After removal of the irritant I painted the gum with a mixture of tincture of iodin, aconite, capsicum, and chloroform. On June 26 the patient complained of a discharge of pus and swelling of the left side of the face. I discovered a fistulous opening situated about a sixth of an inch above the border of the alveolus between the bicuspid and molar.

The second bicuspid was a perfectly sound tooth; the first molar had a small amalgam filling, and upon opening the molar the pulp was seen to be in a healthy condition. I extracted the molar, which was followed by a flow of pus, and after spraying the parts with pyrozone med., 3 per cent., at a pressure of forty to fifty pounds, found an opening into the antrum about a sixteenth of an inch in diameter. Upon removing all the necrosed tissue and cleaning the parts with the spray, I took an impression and had Dr. F. J. McLaren make a small rubber plate to thoroughly close up the orifice.

This case was treated daily for a week with pyrozone med., 3 per cent., and borine, *aa*, spraying the medicament at a pressure of fifty to sixty pounds, using a Davidson atomizer, and sp inkling the extension on the plate with powdered aristol.

I permitted the patient to leave the city, instructing her how to keep the parts clean and keep the plate in an aseptic condition. On July 28 she called, when it was necessary to remove one-half of the extension. On

August 15 the cavity was entirely closed with healthy tissue. September 1 I discharged my patient entirely cured.

In the treatment of pyorrhea alveolaris it is absolutely essential that every particle of deposit of whatever form shall be removed, and that the débris shall be thoroughly washed away, leaving no particles to be ulcerated out; to do this it requires a vigorous stream of water.

Dr. J. N. Farrar introduced for this purpose a set of four syringes with delicate points.

Attached to my compressed-air apparatus at fifty to sixty pounds pressure, I use the Davidson spray tubes filled with pyrozone med., three per cent., and borine *aa*, which throw out such copious spray that it lifts the gum-tissues away from the teeth, introducing the medicament directly to the seat of trouble, forcing away all foreign particles and giving a clean aseptic condition of the parts.

I employ these spray tubes attached to my compressed-air apparatus for introducing medicine and washing out cavities, preparatory to implanting teeth, and I may be concise and say for all wounds and diseases of the oral cavity.

Having considered the advantages derived from the aid of compressed air upon the soft tissues, I will briefly state the results procured through the medium of this agent on the hard tissues,—the teeth.

It is not necessary for me to cite in detail the minute anatomy of the teeth, although a thorough knowledge of the structure of the dentin is requisite to fully appreciate the ideas which I wish to convey.

I will therefore ask your attention to a short review of the minute structure of this tissue. A great portion of the tooth consists of dentin, which is composed of an organic matrix richly impregnated with calcareous salts. This matrix is everywhere permeated with parallel tubes which run, with some deviation, in a direction at right angles to the surface of the tooth.

These tubes start by an open circular mouth upon the surface of the pulp; thence running outward, toward the periphery of the dentin, they become smaller and break up into branches at a little distance beneath the surface of the dentin. Near the pulp they are so closely packed that there is little room between them for the matrix, while near the outside of the tooth they are more widely separated. Their diameter is also greater near the pulp-cavity.

These tubes are subject to slight varicosities, and their course is somewhat interrupted by a small interglobular space. Each tube is occupied by a soft fibril, which is continuous with an odontoblast cell upon the surface of the pulp; of their real nature some doubts have been entertained, but I will not occupy your time by citing from different authorities.

These fibers cannot be considered nerves in the ordinary sense of the word, but there cannot be any doubt that they are media for the transmission of sensory impressions from the dentin to the pulp, and that the peripheral sensitiveness can be allayed by local applications.

Drs. Harlan, Kirk, and Truman demonstrated by experiment that there is an absorption of liquids by osmotic action. The former states that "thymol will diffuse in moist dentin in from three to six hours at 98.4° F.; that non-coagulants, soluble in water, diffuse through tooth-structure, as has been shown repeatedly in experiments outside of the mouth; that oleaginous non-coagulants pass through the structure of a tooth quite slowly in the presence of water in serum albumin, and that the vaporizable portion of an essential oil will give to a substance which it permeates the characteristic odor in from three to six hours."

Professor Truman and Dr. Kirk show by experiments that coagulants will penetrate the tooth-structure, and Professor Truman states "that in proportion to the coagulating power of the agent will be the penetrating force independent of gravitation."

These statements have awakened the profession and provoked no little discussion, although the controversial period is usually only a passing and never the most fruitful period of any truth.

After a science has gained a recognized footing, it has before it its real work to do. The question arises, what can you demonstrate?

These gentlemen have established the fact that medicines will be absorbed through the tubuli *after a certain length of time.* Now you will remember that the glue yielding portion of a tooth contains water to about ten per cent. of the weight of the entire tooth; bearing this in mind, let me ask you, my colleagues, what can we accomplish, after dehydration of the tissues, leaving entirely out of consideration the capillary attraction of these infinitesimal dentinal tubes?

It has been demonstrated that when the water is removed from a tooth, the normal function of transmitting impressions seems to be modified.

This desiccation can be accomplished by several agents, heat, cold, and chemicals.

We know that heat or cold will produce pain, and in the application of either we should proceed with extreme caution.

I use a hot-air syringe similar to The S. S. White's No. 30, only this has twice as large a cylinder. The chamber is filled with carbon, which is found to be one of the best materials for retaining caloric, and only requires a few minutes over a Bunsen burner flame to acquire the requisite amount of heat; with this syringe attached to the compressed-air apparatus, you can so regulate the flow of air that in from one-half to one minute you have the tooth thoroughly dry; then introduce your medicine heated to about 95° F., and you will be able to excavate the tooth without pain, nor will you have any subsequent irritation. With this method it is not necessary to employ acids in introducing cocain, nor is much time wasted waiting for the absorption of the medicament.

You can also use the cataphoric action of cocain for sensitive teeth, but I would first advise the dehydration of the dentin before applying the current, for in that way you gain better results in a shorter time.

In the bleaching of teeth I find that by the application of hot air at a high pressure I am able to produce the required condition in one-half the usual time, as you rapidly evaporate the pyrozone twenty-five per cent., and force it into the tubuli.

It is necessary to be cautious in bleaching teeth so as not to get them too white, as you will frequently observe them somewhat lighter colored on the following day.

In making a tooth perfectly aseptic, the same method of applying your drug as I have recommended in inducing anesthesia will give you a reliable aseptic condition of both tooth and root.

For drying out root-canals use this small point on your syringe, and you can carry heated air directly in the canal, and with a high pressure can force an antiseptic through the canaliculi and tubules, rendering the tissues thoroughly aseptic.

In setting in pivot teeth, we often find it difficult to carry the cement to the upper portion of the root.

In forcing it into the root-canal with a dry instrument, upon withdrawal of the latter the cement is found adherent to it, and not to the walls of the root; but with a high pressure you can force it into every irregularity of the root, while at the same time the compressed air will dry all the surrounding tissue, and you avoid the necessity of wiping away the moisture excreted by the mucous glands.

Where heat is caused by drilling, using sand-paper disks or strips, by applying the cold-air current you can work without any interruption, for it keeps the tooth at about the normal temperature, causing no irritation. Dr. Oscar Adelberg recommends the use of nitrous oxid gas for this purpose, but compressed air you will find preferable and inexpensive.

I will not occupy any more of your valuable time in enumerating the many advantages these appliances have over the ordinary hand-pressure instruments, but will ask you to try them, and I am certainly satisfied that you will never regret having placed this apparatus in your office.

Discussion.

Dr. HUBBARD. I am very glad to find that I feel much more at home than I expected to, on account of the practical and general points laid before you by Dr. Freeman. This paper, contrary to my expectations, is rather more on the medical and surgical line than I had anticipated,—a point which I am very glad to know. The paper is rather comprehensive in its scope as bringing out the application of remedies by this means. It is a means which I use a great deal in my work, which is somewhat akin to yours,—that of nasal and throat treatment. I therefore use the spray a great deal. I have only words of commendation for the treatment which Dr. Freeman has shown you. Tools are, of course, a necessity; but as far as they are concerned not only in dental work, but in all special work of this character, there is such a thing as having too complicated tools, and too many of them. I think the most expert surgeon is he who has the fewest tools, and uses them well—the simpler the better, not too complicated, not too expensive; the

cheaper the better,—provided they are good. That I believe is a necessity in the armamentarium of every dentist and every laryngologist. I believe there is a great use for the sprays that Dr. Freeman has shown you. The great convenience is in the ease with which they may be handled. I have long since ceased to use the hand bulb. You must use both hands, and that is a great objection. I think it is necessary for the left hand to be free, and the apparatus to be used in the right hand. I speak a little more from my own work than from the dental standpoint. In spraying the nasal chamber the best way is to support the head, placing the thumb on the tip of the nose, and using the Davidson atomizer, refraining from interfering with the inferior turbinated. I do not use the hand atomizer as being inconvenient, but I have resorted to many other appliances. I have never seen this one that is shown here, but the cylinder is familiar to you all. The foot-power I have used, also the tank and the other cylinders. I have come down to a very simple device, which I wish to show you later.

Steadiness of pressure is sometimes a necessity, and sometimes an inconvenience. I believe, however, the pressure Dr. Freeman showed you can be regulated. In many cases you desire intermittent pressure, to lessen or strengthen the force as occasion demands. I like then an apparatus that will follow this requirement. Too high pressure is not desirable. Dr. Freeman stated that he uses various pressures from ten pounds to one hundred; I have never seen a case requiring the maximum pressure. For use about the mucous membrane, the nose, the pharynx and the mouth, ten to fifteen pounds is abundant. I never use twenty, unless, as Dr. Freeman stated, it would be desirable to wash away certain portions, as in pyorrhea alveolaris and other diseases of the gums and teeth; then again there are objections to high pressure in pathological conditions about the mouth, where there is granulation tissue. It will cause the tissues to bleed very easily. You would be surprised to see how easily the nasal tissues bleed with a pressure of fifteen pounds. Twenty pounds would, therefore, be too high. For all practical purposes I believe it is not absolutely necessary to measure the force of the current, provided you have a device which will give you about the pressure you desire. It is a matter of nice discrimination, in using the apparatus which I show you, as to just how much force to put on. Sometimes you want more, sometimes less, at the same sitting and at the same using. I can but indorse the importance of the aseptic conditions. I believe too little attention is paid to asepsis in the treatment of oral disease. I believe that the relation of catarrhal difficulties to all diseases of the mucous membrane is very intimate. You would be surprised to find what an intimate relation exists between a post-nasal catarrhal condition, as well as a post-pharyngeal catarrhal condition, and the conditions of the teeth themselves. I had the pleasure of calling to your attention in this case of regulating some circumstances of pathology which might exist in these cases. Dr. Meyer informs me that this young man has the difficulty which I mentioned. It is pathognomonic of that condition. I can only ask you to pay even

more attention than you do to these conditions. Go beyond the mouth and notice the conditions in the air-chamber above.

I put in my bag a little device, not in the spray line, but I ask you to look at it as a simple douche. It costs almost nothing, which is one recommendation. The solution—whatever you wish to use—is placed in the body of it. By placing your finger on this extremity, and the other against the nasal cavity, and taking your finger off, the water flows by its own gravity. There is no force used. Sometimes you want to avoid that force, getting just the weight of the water. This is particularly applicable, rather than a forcible current, to diseases of the antrum. I believe you can irrigate it better with a little device like this than by the spray. There are two of them on the market, Dr. Birmingham's and one made by Whitall, Tatum & Co. Then there is the post-nasal syringe. I wish more of you knew the value of it in rendering these parts aseptic.

I wish to speak also of the requisites for a good wash for these parts. I believe four things should enter into the composition of a wash. I speak of them as applicable to this apparatus which Dr. Freeman has shown, or other apparatus like it. The requisites are that it should be alkaline, antiseptic, agreeable to the patient, and a stimulant. I like the pyrozone and borine which was mentioned. I use the pyrozone stronger than dentists do in their practice. I do not think you need fear it. What you call the caustic effect is not to me a direct caustic effect. It gives the ebullition, but I do not consider that it gives a caustic effect. I use the Oakland preparation of peroxid of hydrogen, which I like better than Marchand's. You might use it in some cases much stronger than you do.

I would like to call attention to a little tablet which I use, composed of three and one-third grains each of sodium salicylate, boric acid, and bicarbonate of soda, with a little oil of wintergreen. I do not think cocain is always required. Dr. Freeman has not mentioned all he could do with this current, hot or cold. To relieve nausea previous to taking an impression, or for other work that you do with the napkin in the mouth, simply take the Davidson atomizer empty, without any solution, blow for half a minute with a pressure of ten pounds through the nasal cavity, and you will find that the turbinated bodies shrink upon themselves. You need not use a medicament for this purpose unless it is an extreme case. Dry air will do it. In aphthous stomatitis I would not use such a high pressure, in order to avoid the bleeding which would result. I would avoid washing away enough to produce a bleeding surface, which gives a new field for the growth of the parasite which is present in such cases. With a pressure of ten pounds wash away enough of the material, which comes away easily, and then apply whatever medicine you wish.

I would like also to speak of the recognition of some diseases which are common, and which Dr. L. Duncan Bulkley has called attention to in relation to syphilitic cases. I was reminded of this by the case which was mentioned as not recognized by a practi-

tioner for some time. How many cases had he infected with his instruments, through his ignorance of what the case really was? These cases are liable to occur, and should be differentiated from aphthous stomatitis and from simple ulcerations.

Dr. Freeman says before applying medicine it is necessary to have a dry surface. I can hardly agree with him that this is necessary. I would hardly dry the surface for the purpose of causing better absorption in the tissues, for I would rather have a clean alkaline surface, using some alkali like sodium chlorid or sodium biborate, or any of the simple alkalies for the purpose of favoring osmotic action. It will take place much easier by the use of an alkali. We will therefore get better absorption from a moist surface made alkaline; but for other reasons the drying is very nicely done with Dr. Freeman's apparatus. I prefer the douche and the syringe in antrum cases where there is a secondary opening at the root of the tooth, or where the middle turbinated body has been sacrificed to such an extent as to expose the ostium maxillare, so as to get good entrance into the antrum. I find Dr. Freeman's tips give a very finely divided spray. I prefer the spray as coarse as possible, for general purposes.

A word about the temperature of the solutions. I am fond of having my sprays placed in a little apparatus which I have made to keep them warm. They should be more than blood heat, so when they are thrown through the atomizing tube they shall be of the temperature of the blood. The tissues rebel if they are too cold or too hot, but if they are just right, the solution is much more effective. I brought this apparatus with me, because I thought it might interest you, as it is so simple. It can be graded very easily and very nicely. It can be obtained from the W. F. Ford Surgical Instrument Company. I would recommend the use of oily sprays. I use them a great deal, and I think they are more effective than watery solutions in many irritable conditions of the membranes.

Dr. E. E. Minner. I have for several years made use of compressed air with most gratifying results. I hope the elaborate display of machinery made here this evening will deter no one from using compressed air in his office. The average dental practitioner seeing eight or ten patients a day would not require more than a hundred pounds of compressed air if he confines himself to his own specialty, and does not trespass upon the field of the nose and throat specialist. The ordinary hand pump and receiver, which will contain one hundred pounds of air, can be obtained at a cost of about twenty-two dollars. This would answer all purposes for the average dentist. The pressure can be regulated at the trigger of the spray, and the use of a forcible spray is certainly to be deprecated.

Dr. S. G. Perry. I have used compressed air for many years. I first saw it used in the office of Dr. Bing, in Paris, about fifteen years ago. His apparatus consisted of a large cylinder, with a simple pump and a little tube connecting from the office, from which the air was received, and it seemed to answer his purpose very nicely. I have in my own cellar a plumber's cylinder, and attached

to that an ordinary hand pump, which my girl who attends to the door looks after. It is her duty to see that it gauges ten pounds a day. That is the average, although sometimes I require fifteen. There is nothing seen of the apparatus except the little tube which comes up about four feet from the floor, and a small gauge which indicates the pressure. I have attached a small flexible rubber tube, and a little hand-piece containing a cut-off, the device of Dr. Wassall; to this hand-piece, which is not much larger than a pencil, is attached my own hot-air device, the principle of which is different from Dr. Freeman's cylinder.

Many years ago I experimented with a cylinder very similar to this of Dr. Freeman's, and made a sort of tubular boiler of it. I made the air pass through twelve or thirteen times before it escaped, with the expectation of having the air at the end of the syringe in a properly heated state; but it did not accomplish the purpose, and I abandoned it and adopted the little bulb attached to the end of the syringe, which you have probably seen advertised by The S. S. White Company. This bulb is made solid so it retains the heat for a time. The hole through it is very minute, so the air passing through shall pass in contact with the metal. The air is delivered warm, though the bulb is not very hot. The pressure can be very gentle, and the air can be just the temperature you want and delivered exactly at the spot you want it. It is entirely under control, and is neater and more manageable than any I have ever seen. It is very serviceable for drying out cavities. For overcoming sensitiveness of the dentin, next to the cataphoric apparatus this is the most efficient thing, and I am not so sure but that the hot air will run cataphoresis a pretty close race, when it is a little better understood. If the same time is taken and the same care used in applying different obtundents, there are not many cavities that cannot be made so that they can be excavated without very severe pain.

Dr. FREEMAN. I wish to thank the gentlemen for their discussion. In using Dr. Hubbard's apparatus you cannot obtain a greater pressure than ten to fifteen pounds, which is probably all that is required or desirable for nasal work; but for our purpose we require a high pressure, especially in the treatment of pyorrhea, where it is necessary to wash out the entire depth of the pockets to produce a clean aseptic condition.

In stomatitis the washing away of the membrane enables us to make the parts thoroughly aseptic, while with a low pressure you would not obtain the same beneficial results. In all surgical operations when I use this apparatus I find the best results from high pressure, as you have a copious flow of the medicaments which thoroughly cleanses the parts, and as soon as granulation is apparent the pressure can be reduced, so as not to break down the new tissue. The pressure can be readily varied with my apparatus without any inconvenience by manipulating the cut-off or valve.

In reply to Dr. Perry, I would say that all that can be seen of the apparatus in my operating-room is a small gauge, a regulator, and three tubes. The apparatus here exhibited is composed of a

variety of hand pumps and cylinders. I was unable to have a duplicate of my apparatus placed in here, as it would require a plumber to make the necessary attachments to the water-pipes. This compound pump is similar to the one in my laboratory, and it works automatically; you do not require any one to fill your air cylinder by pumping. A small cylinder has numerous objections, for at the time you need it most you find the cylinder empty, nor can you obtain the constant high pressure for any length of time. I suppose this apparatus without hot-air syringes or other appurtenances would cost seventy-five dollars.

I have done considerable experimenting with hot-air syringes, and at one time I had a device made of copper tubing and heated it over a Bunsen burner, but could not do anything with it, because I found it was necessary to have the heat near the point of the syringe. I think that Dr. Perry's device is a very good one, but I would be afraid of burning the patient.

Dr. Perry. It is not necessary to heat it enough to burn the patient. Covered with a shield there is never any danger.

Adjourned. B. C. Nash, *Secretary.*

Academy of Stomatology of Brisbane, Queensland.

A meeting of dentists was held on Wednesday, December 9, 1896, at the rooms of Dr. Rendle, in Brisbane, for the purpose of inaugurating an Academy of Stomatology. The object of the academy is to hold meetings for the discussion of scientific subjects relating to dentistry, and to form a dental library and museum. The library will contain a collection of works by the latest and best authors, and all dental literature up to date. The museum will be established with the object of preserving and recording all interesting specimens relating to the science of dentistry. The following gentlemen were unanimously elected to form a committee of management and to fill the following offices: Dr. Rendle, organizing secretary; W. G. Henderson, curator of museum; P. M. Coughlin, librarian; R. B. Thomason, treasurer, and A. J. Coren, secretary.

DENTAL SOCIETY ANNOUNCEMENTS.

Pacific Coast Dental Congress.

In accordance with resolutions adopted at the Midwinter Fair Dental Congress, another such congress will be held in San Francisco in 1897, beginning the third Tuesday in August, and continuing four days.

It is hoped that this will be a larger meeting than ever held on the coast, that every dentist here will be present, and that many will be attracted from the east.

The management of the congress is vested in a general committee, consisting of representatives from the Midwinter Fair Dental Congress, and from all other dental organizations on the coast.

This general committee has organized and appointed various sub-com-

mittees, so that each part of the work will be in the hands of worthy and energetic men.

The president, vice-president, and secretary-general will be elected by the general committee six months before the meeting of the congress.

The president of each dental organization entitled to representation will be an honorary vice-president of the congress.

Each dental society of not less than ten members adopting the code of ethics of the American Dental Association, each recognized dental college faculty, and each board of dental examiners on the coast may elect one member for the general committee for each twenty members of said society, or fraction thereof.

Dental societies, faculties, or state boards not yet represented on this committee, will please send names of delegates to the secretary so that representation may be as complete as possible.

Membership.—Any legal and reputable dentist within the jurisdiction of the congress, upon approval of the membership committee, may become an active member of the congress. The membership fee will be five dollars, payable at the opening of the congress. Application blanks will be furnished by the chairman of the membership committee.

Members of the profession wishing to present papers or give clinics, will please communicate with the chairman of the program or clinic committee. All papers or duplicates must be in the hands of the program committee at least two weeks before the opening of the congress, so that those appointed to open discussions may have an opportunity to prepare for the same.

The transportation committee expects to make arrangements with railroad and steamship lines for reduced rates. Blank applications for such reduced rates may be obtained from the chairman of that committee.

A cordial invitation is extended to all honorable members of the profession to take part in this congress. Let every man urge his neighbor to come and make it a grand success.

FOR THE GENERAL COMMITTEE.

C. L. GODDARD, *Chairman*,
406 Sutter St., San Francisco.

R. W. MEEK, *Secretary*,
1169 Bdw'y, Oakland.

CHAIRMEN OF COMMITTEES.

Executive.—W. F. Lewis, 462 Thirteenth street, Oakland.
Auditing.—Thos. Morffew, Market and Kearney sts., San Francisco.
Program.—F. L. Platt, Flood Building, Market st., San Francisco.
Publication.—J. D. Hodgen, 1005 Sutter st., San Francisco.
Transportation.—L. A. Teague, 10 Geary st., San Francisco.
Invitation and Membership.—F. H. Metcalf, Sacramento.
Local Arrangements.—C. E. Post, 14 Grant avenue, San Francisco.
Reception.—H. G. Richards, 931 Sutter st., San Francisco.
Operative Clinics.—R. H. Cool, 300 Stockton st., San Francisco.
Prosthetic Clinics.—W. F. Sharp, 606 Sutter st., San Francisco.
Exhibits.—H. D. Boyes, 736 Sutter st., San Francisco.

DENTAL SOCIETY STATE OF NEW YORK.

THE twenty-ninth annual meeting of this society will be held in Albany, May 12 and 13, 1897, at which time the following program will be presented: President's Annual Address, H. J. Burkhart, D.D.S.; Report of the Correspondent, R. Ottolengui, M. D. S.; Report of the Committee on Practice,

A. R. Starr, D.D.S.; Amalgam Fillings, with a Practical Demonstration, G. V. Black, M.D., D.D.S., Sc.D., Jacksonville, Ill.; "Dental Organizations," James Truman, M.D., D.D.S., Philadelphia; "Irregularities of the Teeth and their Correction," J. N. Farrar, M.D., D.D.S., New York; "Cataphoresis," H. W. Gillett, D.M.D., Newport, R. I.; Subject to be announced, B. Holly Smith, M.D., D.D.S., Baltimore.

Members of the profession are fraternally invited to attend.

H. J. BURKHART, D.D.S., *President*, Batavia.
C. S. BUTLER, D.D.S., *Secretary*, Buffalo.

NORTH CAROLINA STATE DENTAL SOCIETY.

THE twenty-third annual meeting of the North Carolina State Dental Society will be held at Charlotte, N. C., May 12, 13, and 14, 1897. An interesting program is being prepared, and a most cordial invitation is extended to all members of the profession in good standing; and especially do we invite those from contiguous states, Virginia, South Carolina, Georgia, and Tennessee.

The State Board of Dental Examiners will meet at the same place on Tuesday (the 11th) for the examination of those desiring license to practice dentistry in this state.

C. W. BANNER, *Secretary*,
Mount Airy, N. C.

SOUTHWESTERN IOWA DENTAL SOCIETY.

IN response to invitations issued Jan. 1, 1897, to the dentists of Southwestern Iowa, then assembled at Creston, Ia., on the 15th a numbe· of the profession formulated an organization to be known as The Southwestern Iowa Dental Society, electing Dr. H. H. Gantz president, Dr. J. W. Manker vice-president, Dr. M. F. Stever secretary, Dr. J. A. Ross assistant secretary.

The first meeting is to be held at Red Oak, June 2, 3, 4, 1897, at which time we expect to have one of the best meetings ever held in the state.

M. F. STEVER, *Secretary*,
Creston, Ia.

VERMONT STATE DENTAL SOCIETY.

THE twenty-first annual meeting of the Vermont State Dental Society will be held at Pavilion Hotel, Montpelier, March 17-19, 1897.

The Executive Committee are arranging a very interesting program, and a good attendance is expected. A cordial invitation is extended to all.

THOMAS MOUND, *Rec. Sec.*,
Rutland, Vt.

CENTRAL DENTAL ASSOCIATION OF NORTHERN NEW JERSEY.

AT the annual meeting held February 15, 1897, the following officers were elected for 1897-98: William L. Fish, D.D.S., Newark, president; F. Edsall Riley, D.D.S., Newark, vice-president; Charles A. Meeker, D.D.S., Newark, treasurer; Herbert S. Sutphen, D.D.S., Newark, secretary; Geo.

E. Adams, D.D.S., South Orange, W. E. Truex, D.D.S., Freehold, S. C. Hardy, D.D.S., Summit, F. S. Gregory, D.D.S., Newark, Fred C. Barlow, D.D.S., chairman, Jersey City, executive committee.

H. S. SUTPHEN, *Secretary.*

ILLINOIS BOARD OF DENTAL EXAMINERS.

THE Illinois State Board of Dental Examiners will meet Monday, March 29, 1897, at Chicago, for the purpose of examining candidates and transacting other business.

All persons intending to appear before the board at that time should notify the secretary not later than March 15.

L. L. DAVIS, *Secretary,*
1303 Columbus Memorial Bldg., Chicago, Ill.

MISSISSIPPI STATE BOARD OF DENTAL EXAMINERS.

THE Mississippi State Board of Dental Examiners holds its annual meeting at Jackson, Miss., on the first Tuesday in April, 1897. All applicants desiring permanent license to practice dentistry in this state are required to appear before the board on the first Tuesday in April for examination.

G. B. CLEMENT, D.D.S., *President.*
L. G. NISBET, D.D.S., *Secretary,*
Jackson, Miss.

EDITORIAL.

STOMATOLOGY.

NOTWITHSTANDING the doubtful welcome which was accorded the term stomatology and its derivatives by some members of the dental profession, these titles are evidently gaining a permanent place in our terminology. The reason for this is that the idea contained in the term stomatology was fully developed before it received a specific designation.

The fact that the teeth are not isolated organs independent of the nutritive systemic relations of the whole body has gradually found acceptance, and the field of dental study and treatment has correspondingly widened and will doubtless continue to develop until all the factors contributing to the production of normal teeth and their several aberrations from the normal standard, as well as of all the tissues and organs of the oral cavity, are fully included within the field of activities of those to whose care and treatment these organs are relegated. This being the case, the older term, dentist, is seen to be inadequate. Dr. Williams truly says, "The significance of all scientific terms must, in the nature of things, be more or less elastic. Every new truth discovered in any department of science must necessarily enlarge or modify the meaning

of such terms as have been used in the particular field in which the discoveries occur;" and his views respecting scientific terms are equally applicable, by reason of the analogies, to the terms under consideration. It is not surprising that objectors to the new term should arise; representatives of that genus are always in evidence whenever an advance step is made in human affairs; but where the motive of such progress is founded in truth it will continue to develop despite the temporary obstacles which may impede it occasionally.

The acceptance of the term stomatology need not by any means imply that it is to be substituted for the term dentistry, or that dentistry is to be superseded. But inasmuch as dentistry is less comprehensive in its meaning than stomatology, the term dentistry must find its application to the more restricted lines of practice pursued by those who deal exclusively with the teeth. If dental practice is to include a wider range and take cognizance of disorders of all of the oral tissues and organs, then surely the term dentistry is a misnomer as applied to their study and treatment. It is for the purpose of including these that the term stomatology was suggested. Its philological fitness cannot be doubted; and as our specialty continues to develop, the general acceptance of the term for its proper designative purpose is sure to follow.

We note elsewhere two recent adaptations of the term which indicate the growing favor which is accorded it. As a matter of historical interest we here call attention to a fact which may not be generally known: that the word stomatology was first suggested by Professor Thomas C. Stellwagen as an appropriate designation for the Academy of Stomatology instituted at Philadelphia, and the first to use the term in July of 1894.

The Stomatologist.

The interest in dental college journalism evidently continues to grow. We are in receipt of the initial issue of *The Stomatologist,* "issued monthly in the interest of the Alumni of the Philadelphia Dental College." We have heretofore drawn attention to the importance of college journalism as an educational factor which should be encouraged and utilized for its good effect upon those who are about entering our ranks, and we therefore welcome this new candidate for favor and wish it a successful mission in its chosen field.

Dentists in the Army and Navy.

We direct especial attention to the article by Dr. Arnold in this issue, because of the importance of the suggestion which it contains. The desirability of making such appointments is self-evident to dental practitioners as well as to all whose general knowledge of human affairs includes an understanding of the hygienic importance of the teeth. An additional and cogent reason for the appointment of dentists in connection with our national defensive service will be found in the article by Dr. Thompson, also in this issue. No more accurate means of identification is attainable than that furnished by a complete dental record, and it is surprising that such a means has not been heretofore included in the otherwise admirable methods now in use in connection with our army and navy service.

Erratum.

In the article by Dr. W. A. Price on "Relative Efficiency of Current Controllers for Cataphoresis," in the February number of the Dental Cosmos, the following corrections should be made: On page 95, twenty lines from bottom, read "20,000," not 2000 ohms; page 97, eight lines from bottom, read "milliampere," not ampere; page 101, twenty-two lines from top, read "5000," not 500 ohms.

OBITUARY.

William Newton Morrison, D.D.S.

Died, at Hot Springs, Ark., December 20, 1896, of a gunshot wound of the head, Dr. William Newton Morrison, in his fifty-fifth year.

Dr. Morrison was born at East Springfield, Ohio, May 25, 1842. His early education was obtained in the common schools. In 1858 he went to St. Louis to become a student of his brother, James B., the inventor of the Morrison dental engine and chair. In 1864 he graduated from the Ohio College of Dental Surgery. In 1868 he married Miss Cornelia Holme, of Hannibal, Mo. Two sons, Peter Holme and William N., were the result of this union.

The doctor was so successful in his early practice as to be able, in 1872, to build a house which combines a dwelling and a dental office, each complete for the purpose intended; the plans were made by the owner, and were published, with illustrations, in the *Missouri Dental Journal.*

Dr. Morrison kept abreast of the advances of his profession, and was one of the first to use the mallet and to construct gold crowns. He was one of the first to revive the "planting" of teeth, as he called it, his first cases being reported in 1874; the last report was made at the last meeting of the St. Louis Dental Society he attended, on December 1, 1896. He cheer-

fully gave to others ideas which he thought might interest or benefit them, and always took pleasure in entertaining dentists who visited him.

Dr. Morrison became a Mason in 1865. He was brought up a Methodist, but, after marrying, joined the Presbyterian Church. He was a constant attendant of dental societies, and held membership in the American, Southern, Illinois, and St. Louis societies, frequently writing papers, giving clinics, and joining in the discussions in those of which he was an active member. He was some time president of the Missouri and twice president of the St. Louis. He took an active part in the Missouri Dental College, filling the chair of Mechanical Dentistry, also acting as demonstrator, and gave clinics every session when in the city. Dr. Morrison traveled extensively. In July, 1878, he started on a trip around the world which consumed about a year. While on this trip he studied the status of the profession in the countries visited, bringing home with him specimens of work found while abroad. In 1890 he took a trip to Germany for his health; again, in 1894, accompanied by his wife, he made a trip to Europe. He had been to the West Indies, and also traveled extensively in this country.

Dr. Morrison was a frequent writer for dental journals. Many of his articles and items are to be found in the *Missouri Dental Journal* and its successor, the *Archives of Dentistry*, both of which he aided in many ways. Of the former he was one of the editors of the department of Mechanical Dentistry for four years. He was a public-spirited citizen, and did his share for the public good; at his own expense he placed numbers of the streets on Washington avenue from Jefferson avenue to King's Highway.

Dr. Morrison was well known and esteemed in this country and abroad. He was the inventor of the Morrison dental bracket, which was one of the first on the market. His success was gained by hard, faithful work, and he was ever ready to lend a helping hand to his fellow-man.

At a special meeting of the St. Louis Dental Society held December 22, 1896, and called for the purpose of taking action upon the death of Dr. Morrison, eulogistic remarks were made by the president and by Drs. H. J. McKellops, G. A. Bowman, J. H. Kennedy, and William Conrad. Suitable resolutions and a biographical sketch were drafted, from which we extract the foregoing notice.

Seneca Buel Brown, M.D., D.D.S.

Died, at Fort Wayne, Ind., of heart-failure, January 5, 1897, Dr. Seneca B. Brown.

Dr. Brown was born in Marlboro, Windham county, Vt., August 11, 1834. He began the study of dentistry November 1, 1852, with Oramel R. Post, D.D.S., of Brattleboro, Vt., and remained with him until January 1, 1854, when he opened an office in Ticonderoga, N. Y., for the practice of dentistry. He graduated February 26, 1870, at the Pennsylvania College of Dental Surgery, and March 1, 1871, from the Ohio College of Dental Surgery. On March 6, 1888, the honorary degree of Doctor of Medicine was conferred upon him by the Fort Wayne Medical College.

Dr. Brown located his office at Fort Wayne, Ind., May 3, 1865, and was in the active practice of his profession until within about three weeks of his death, covering a period of nearly thirty-two years. He was a member of the American Dental Association, the Indiana State Dental Association,

the Northern Indiana Dental Association, and the Isaac Knapp Coterie of Fort Wayne, Ind. He was president of the Northern Indiana Association at the time of his death, was president of the Indiana State Society in 1885, and of the Isaac Knapp Coterie in 1895.

Dr. Brown was twice married. His first wife was Miss Nannie Louise Johnson, of Piqua, Ohio, to whom he was married June 7, 1864, and who died July 6, 1874. On February 14, 1888, he was again married to Miss Minnie Russell Graves, of Ashtabula, Ohio, who survives him.

Dr. Brown was an enthusiastic lover of his profession, an active worker in the societies of which he was a member, a man of high sense of honor and strict integrity, and beloved by all who came into contact with him. His demise is a serious loss to the profession of his state, but especially to the members of his local society, who were thrown into most intimate relation with him. Appropriate resolutions, expressive of the high esteem in which he was held, were passed at a recent meeting of the Isaac Knapp Coterie.

Dr. Brown was an active and enthusiastic member of the Sons of the American Revolution; he was the organizer and one of the charter members of the Anthony Wayne Chapter of Fort Wayne, and at the time of his death was president of the state organization.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JANUARY, 1897.

January 5.—No. 574,763, to F. A. Rudolph. Dental tool.
" *12.*—No. 574,877, to F. W. Blomiley. Dental mouth-mirror.
" " No. 575,108, to Wm. H. Duddy. Dental napkin clamp.
" " No. 26,511, to Chas H. Sharp. Design for cuspidor attachment.
" *19.*—No. 575,629, to John C. Blair. Fountain spittoon.
" *26.*—No. 575,684, to James Baxter. Dental chair.
" " No. 575,750, to G. H. Winkler. Dental tool.
" " No. 575,894, to J. E. Keefe. Dental clamp.

THE

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ORIGINAL COMMUNICATIONS.

A CONTRIBUTION TO THE STUDY OF PATHOLOGY OF ENAMEL.

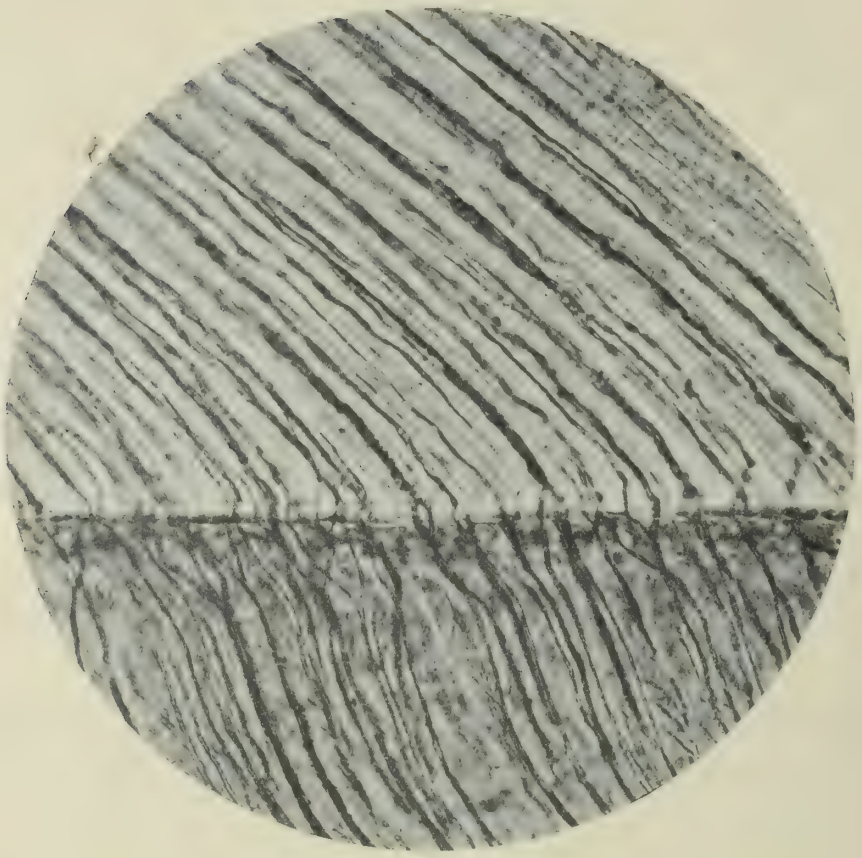
BY J. LEON WILLIAMS, D.D.S., L.D.S., LONDON, ENG.

(Read before the New York Odontological Society, January 12, 1897.)

(Continued from page 196.)

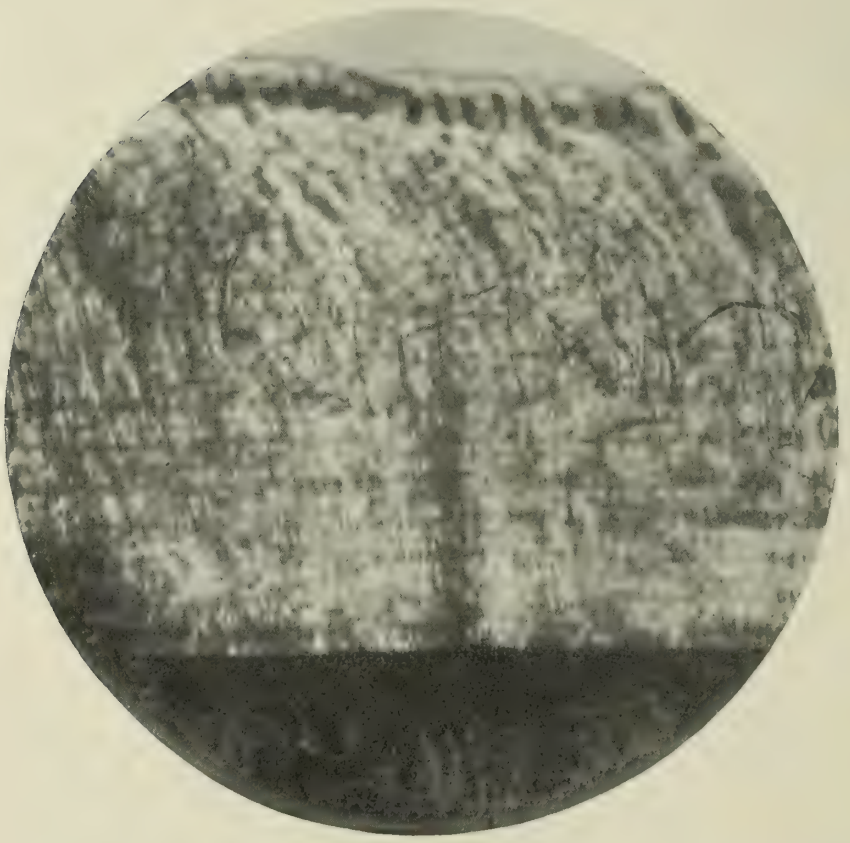
THE Heitzmann school of histologists have made the appearances of organic or living matter a distinctive feature of their representations of enamel. Let us see what foundation can be discovered for their claims in this direction. If we examine a section of a marsupial tooth under the microscope, we shall probably see most of the dentinal canaliculi passing over into the enamel and usually continued through this tissue to the surface (see Fig. 31). It is not such an easy matter as might at first appear to prove that these canaliculi contain fibers. The staining methods adopted by Drs. Bödecker and Abbott are very unsatisfactory and inconclusive, as I shall presently demonstrate to you. If we remove a tooth from the jaw of a kangaroo and immediately grind a section under water, and then partially decalcify the section, stain and mount in glycerol, we shall see that some of the fibers in the enamel have partly floated out of their canals, as shown in Fig. 32. Thus we have the most positive proof of the presence of living matter in enamel. But these fibers have no relation to the enamel-fibers of Dr. Bödecker. One occasionally finds specimens of human teeth in which the dentinal canaliculi are apparently continued into and sometimes nearly or quite through the enamel. Such appearances are shown in Figs. 33 and 34, the former from a human tooth and the latter from the tooth of a monkey. Careful experiments show that while the canals sometimes penetrate the entire thickness of enamel, the fibers are usually continued but a short distance into the tissue. Sometimes a few granules appear farther on in the canals, but for the most part they seem to be empty or filled with

FIG. 31.



SECTION OF INCISOR OF KANGAROO. × 400.
Showing dentinal fibrillæ penetrating enamel.

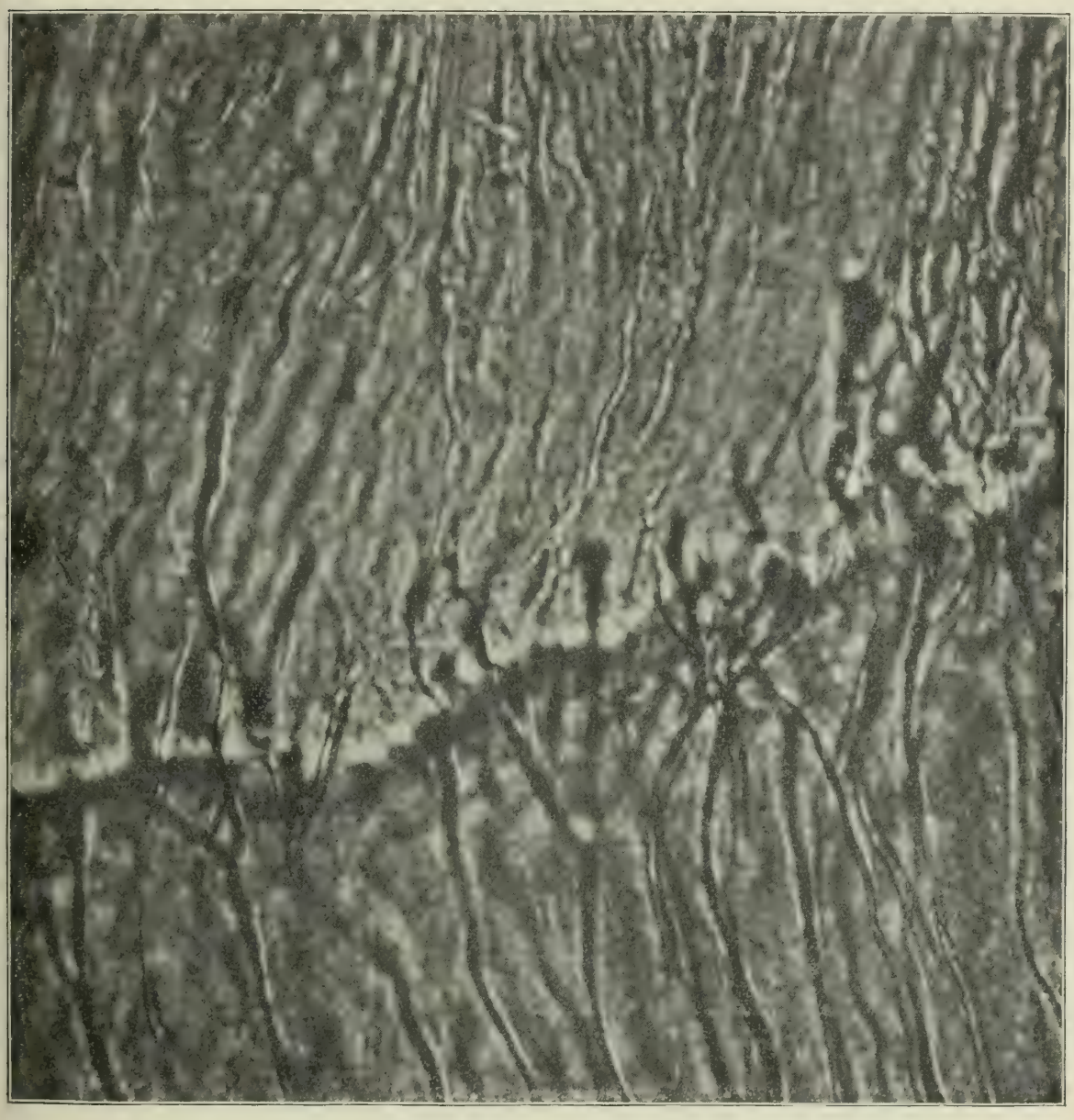
FIG. 32.



SECTION OF PARTLY DECALCIFIED ENAMEL FROM INCISOR OF KANGAROO, SHOWING STAINED FIBERS IN ENAMEL. × 300.

fluid. If we examine these canals under high power with oblique light and a rotating stage, we shall find that the appearance of the fiber is nearly always on the *shadow* side of the canal. If now we stain one of these sections with an anilin dye and fix the stain with a mordant, and then submit the section to the action of slightly acidulated alcohol, we shall find that all color is speedily removed from the enamel, except from the surface, when the

FIG. 33.



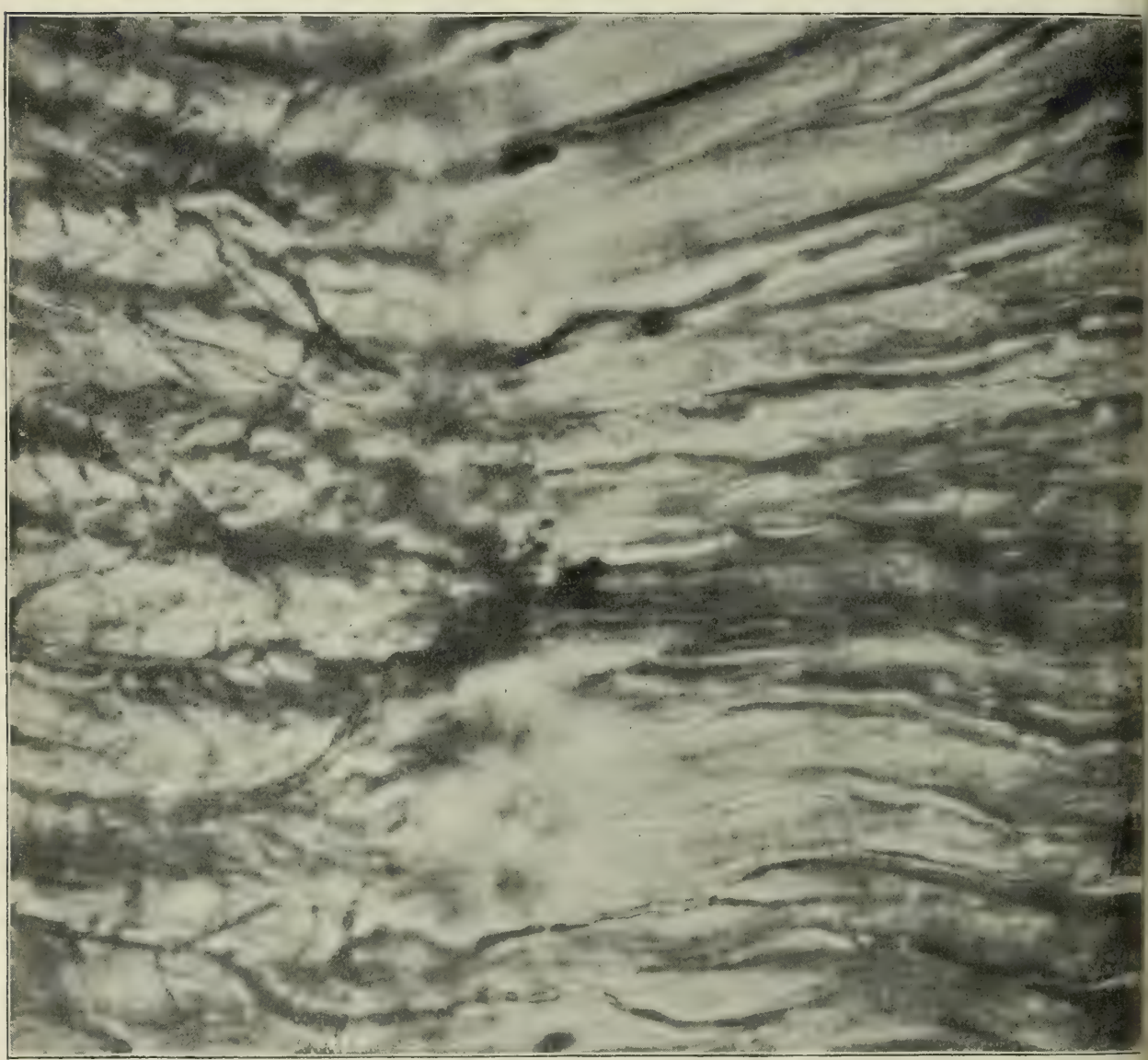
SECTION OF HUMAN MOLAR, SHOWING DENTINAL FIBRILLÆ PENETRATING ENAMEL. × 600.

organic matter of micro-organisms is present. Here the color is held very tenaciously, as it is also in the dentin. From these and many other experiments I conclude that the dentinal fibrillæ, although sometimes penetrating for considerable distances into the enamel, generally become atrophied with the complete calcification of this tissue. Canals are thus not infrequently left in the enamel into which staining fluids easily pass, and the appearances thus

caused are very deceptive. Chlorid of gold is, in this respect, one of the most deceptive and unreliable of stains.

Fig. 35 is from a dried human tooth, and Fig. 36 from the fossil tooth of a mastodon. Both specimens have been stained, and both appear to contain fibers which have taken the stain, but it is quite safe, I think, to assert that there are no fibers of living matter in the fossil tooth of a mastodon.

Fig. 34.



Section of Tooth of Monkey, showing Dentinal Fibrillæ penetrating Enamel. × 800.

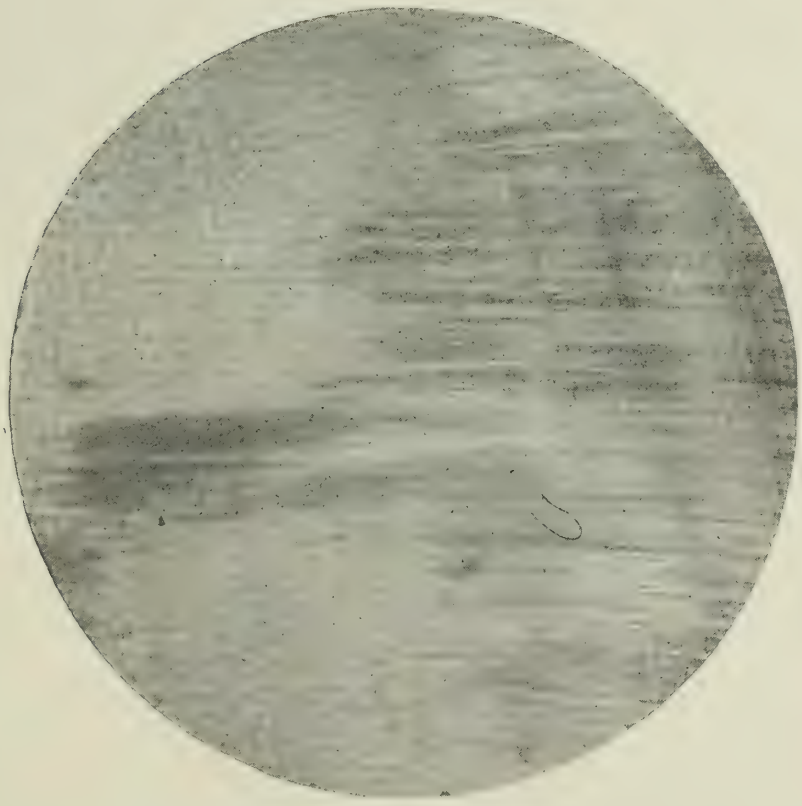
During the course of these investigations, I mounted a specimen of partially decalcified enamel which I at first thought showed unmistakable evidence of fibers passing from the dentin quite through the enamel. The specimen was ground so that the outer surface came on the beveled slope of a cusp, thus producing a knife-like edge, and the acid, acting on this very thin margin, has effected almost complete dissolution of the enamel-rods. The center of some of the rods still remains, but so small and as to look like a fiber. Very close inspection one day enabled me to trace

FIG. 35.



SECTION OF ENAMEL FROM HUMAN INCISOR, SHOWING HOW CANALS CAN BE IMPREGNATED BY A STAIN SO AS TO PRODUCE THE APPEARANCE OF FIBERS. × 150.

FIG. 36.

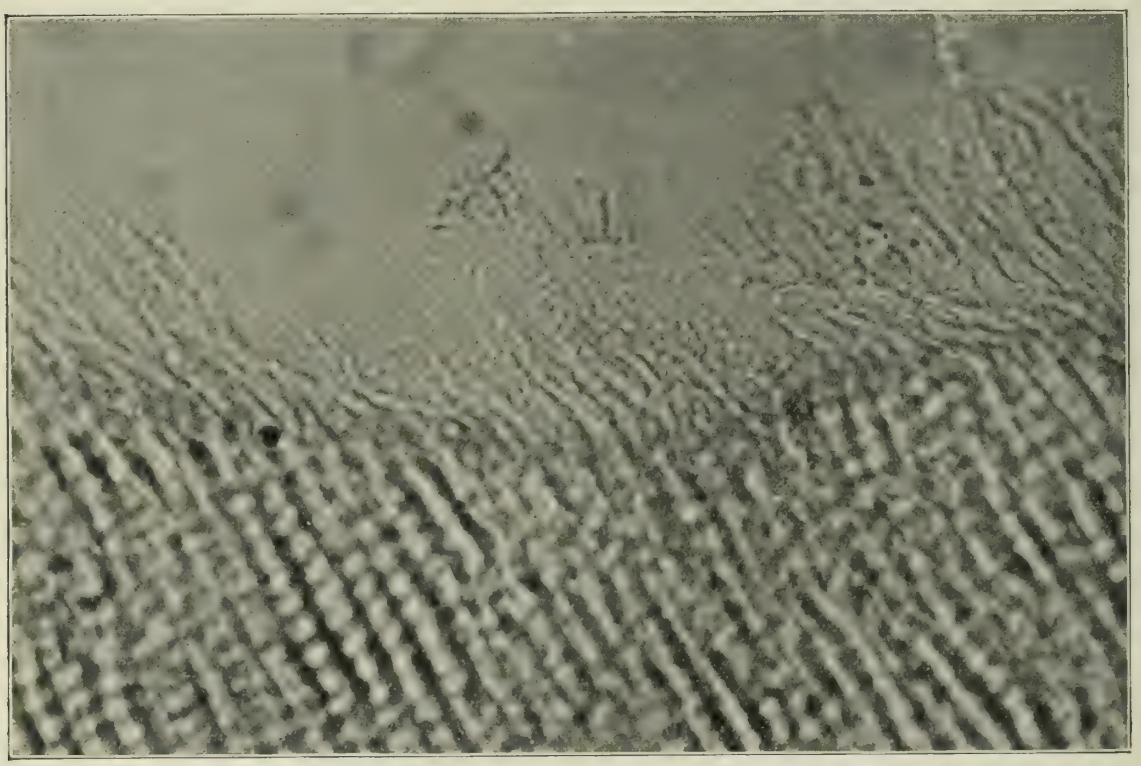


SECTION OF ENAMEL FROM FOSSIL TOOTH OF MASTODON. × 150.
Canals filled with a stain producing the appearance of fibers.

these fiber appearances from the edge inward to the thicker part of the tissue. I then saw each fiber gradually enlarge until it became an enamel-rod. Looking again at the finer continuation of the rod, I could in places see the last disappearing traces of the globular bodies along what I had at first taken for a fiber. (See Fig. 37.) There is no doubt, however, that during the developmental period the dentinal fibers sometimes penetrate the entire thickness of the enamel, and it is possible that these fibers may not always become completely atrophied.

Cope has shown that reversions to ancestral types are not infrequently found in human teeth, as, for instance, in the lemurian trituberculate form of molar teeth. It is somewhat more sur-

FIG. 37.



FROM SECTION OF NORMAL HUMAN ENAMEL TREATED WITH HYDROCHLORIC ACID. × 500.
The acid, acting on a natural bevel on the upper margin of the specimen, has almost completely decalcified the enamel-rods, the fine remains of which present the appearance of fibers.

prising, however, to find a reversion in the minute anatomy of the human tooth to the form of structure which is only fixed or permanent in the far-off marsupial tooth, for that is what we seem to have in the specimens I have just been exhibiting.

I have not infrequently found numerous canals near the surface in enamel that would be considered from its external appearance to be of the finest quality (see Fig. 38). But, as Dr. Black has pointed out, the habit has been formed by most dentists of looking upon the enamel of teeth which have escaped caries up to the fortieth or fiftieth year as being of very fine quality. As we proceed with our microscopic investigations it more and more becomes evident that there may be great fallacies attached to such conclu-

sions. If such specimens as are shown in Figs. 35 and 38 had been prepared from rapidly decaying teeth, they would have been considered by most dentists as supplying a striking illustration of the significance of a strong predisposing cause of caries. Figs. 39 and 40 are from a syphilitic tooth, and this, as also the tooth from which the specimen shown in Fig. 33 was ground, were from the mouths of patients past fifty years of age. In both instances the teeth were removed because of extreme looseness, and in both instances the remaining teeth were nearly free from caries and also from filled cavities. The micro-organisms which fill the pit in the enamel in Fig. 34 had, before staining, that peculiar red-

FIG. 38.



SECTION OF ENAMEL FROM HUMAN INCISOR. × 500.
Shows imperfect calcification and appearance of canals near the surface.

dish-brown color which I have always observed where caries is not in progress. The structure of the tissue in this specimen when seen under a magnifying power of eight hundred to one thousand diameters (see Fig. 41) looks much like cementum, for which it might easily be mistaken but for the indications everywhere of badly calcified enamel-rods. Large lacunæ-like spaces, which appear to be filled with organic matter, are seen, some of which have radiating processes and others seem to communicate with the dentin by means of canals. In other parts of the enamel of this tooth large cavities of various shapes appear, some of which communicate with each other (see Fig. 41). This specimen was temporarily mounted in glycerol, and after the photographs just shown were made I removed the specimen, washed it and

placed it in a strong solution of picro-lithium-carmin, where it remained twelve hours. It was then washed in absolute alcohol and mounted in balsam. The basis-substance of the dentin is stained yellow, the interglobular spaces in the dentin and the micro-organisms on the surface are stained deeply with the carmin, but there is not a trace of stain in the substance of the enamel. I do not, therefore, believe that these large spaces contain living matter. It is of course perfectly plain that if the true

FIG. 39.



SECTION OF HUMAN INCISOR, SYPHILITIC. × 175.
Showing extremely imperfect enamel with appearance of masses of organic substance which does not, however, retain stains as living matter does.

predisposing cause of caries were present in such cases, the enamel would yield very rapidly to the attacks of decay-producing bacteria.

Nearly all writers on the pathology of the teeth have referred to the presence of interglobular spaces in the dentin as a special evidence of the degeneracy of tooth-tissue and as usually accompanying markedly faulty enamel. This certainly seems to be the case in human teeth. Fig. 42 shows a territory of dentin from the syphilitic tooth just mentioned. But interglobular spaces are

found more frequently in the teeth of certain animals than in human teeth. I have often observed them in the teeth of the larger monkeys.

Fig. 43 is from the dentin of the Australian opossum (*Phalangista Vulpina*). The uncalcified spaces are more evenly distributed throughout the dentin, but the total amount of uncalcified area is probably quite equal to that shown in the specimen from the syphilitic tooth.

Fig. 44 shows granular pigmented enamel and poorly calcified dentin from the tooth of the dugong.

The photographs shown in Figs. 45 and 46 are, to me, in some respects the most interesting ones accompanying this paper. They tend to confirm all that I have previously written on the subject of

FIG. 40.



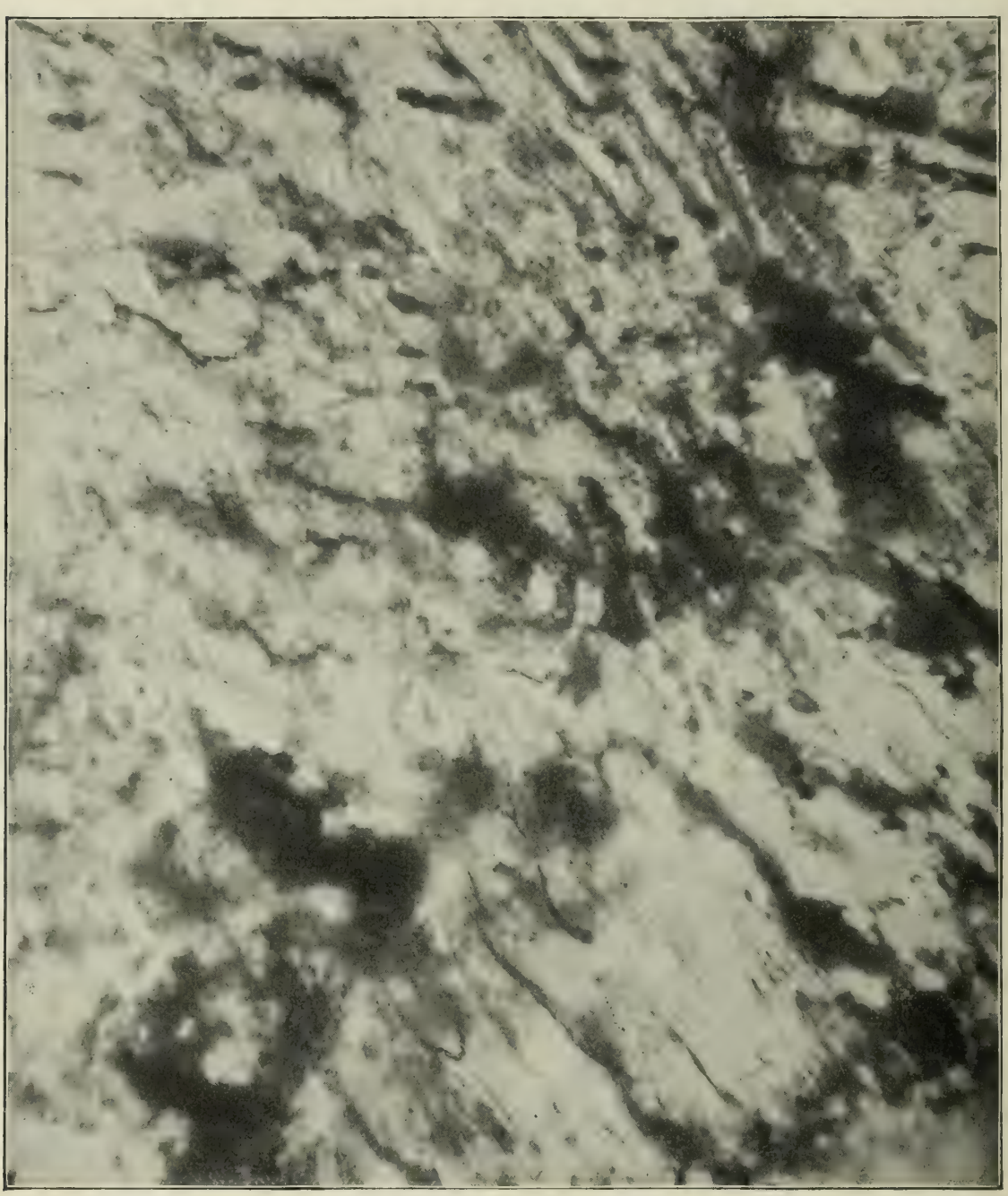
SECTION OF ENAMEL FROM SYPHILITIC TOOTH. × 600.
With appearances resembling the lacunæ of cementum.

enamel formation, and also to prove the fallacy of the teachings of the Heitzmann school concerning the arrangement of organic matter in enamel.

Bödecker and Abbott have taught and illustrated the presence of a delicate reticulum of living matter in enamel formed by a minute fiber passing between the enamel-rods and sending out very fine thorn-like processes, which processes produce the striated appearance of the rods. I have shown the most abundant evidence that the striation of the rods is due to a totally different cause. Fig. 45 is from a specimen of nearly decalcified enamel. The light line on the left side of the specimen is a line of striation caused by imperfect calcification. This specimen was mounted in glycerol, and pressure upon the cover glass showed that the portion outside of

the line of striation moved slightly, but was held to the main mass by delicate fibers, which were not *between* the rods, but which constituted the organic basis of the rods themselves. At one point on the margin of the specimen the loose and curled-up ends of a few of these fibers can be distinctly seen.

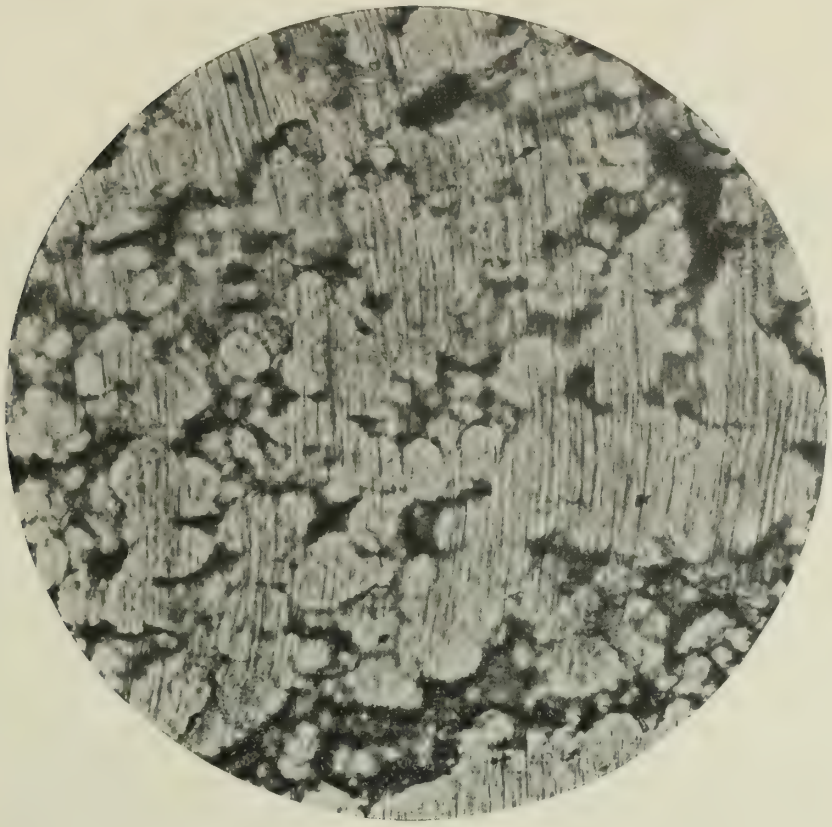
Fig. 41.



Section of Enamel from Syphilitic Tooth. × 800.

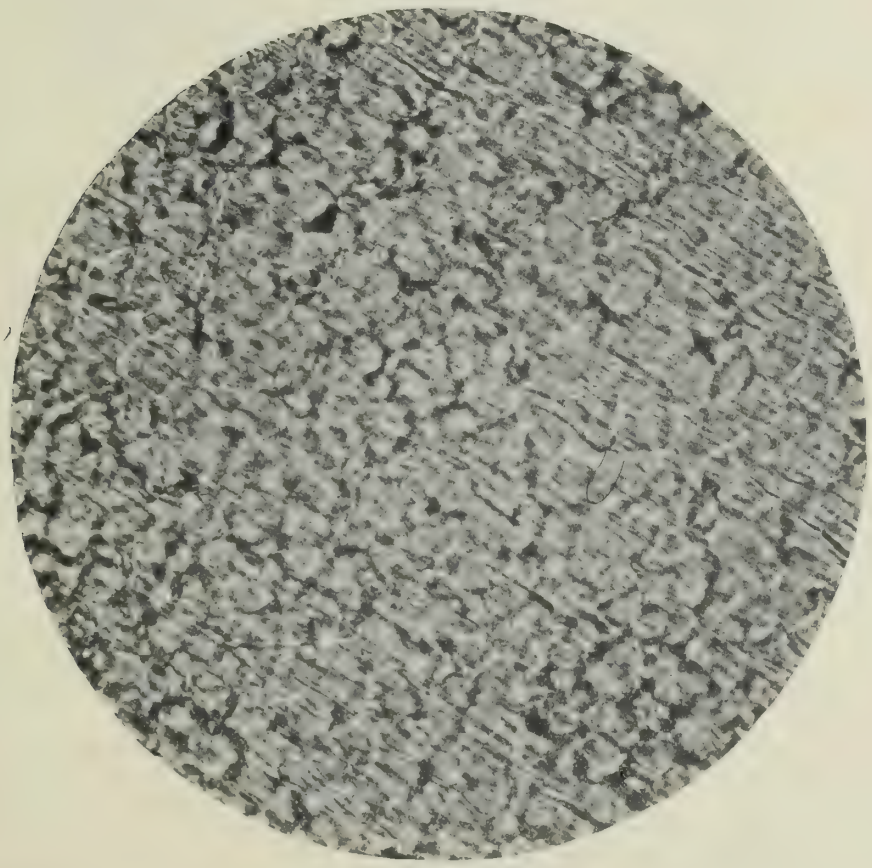
Fig. 46 is even more convincing than the foregoing. Here the rods are decalcified at their ends only. One can clearly see just where the last calcific remains of the globular bodies are disappearing, and projecting beyond these points are seen the faint ghost-like forms which constitute the organic substructure of the enamel-rods. The specimen is much more striking under the microscope, because the globular bodies on the border of the decalcified area

FIG. 42.



SECTION SHOWING INTERGLOBULAR SPACES IN DENTIN OF HUMAN TOOTH. SYPHILITIC.
× 250.

FIG. 43.

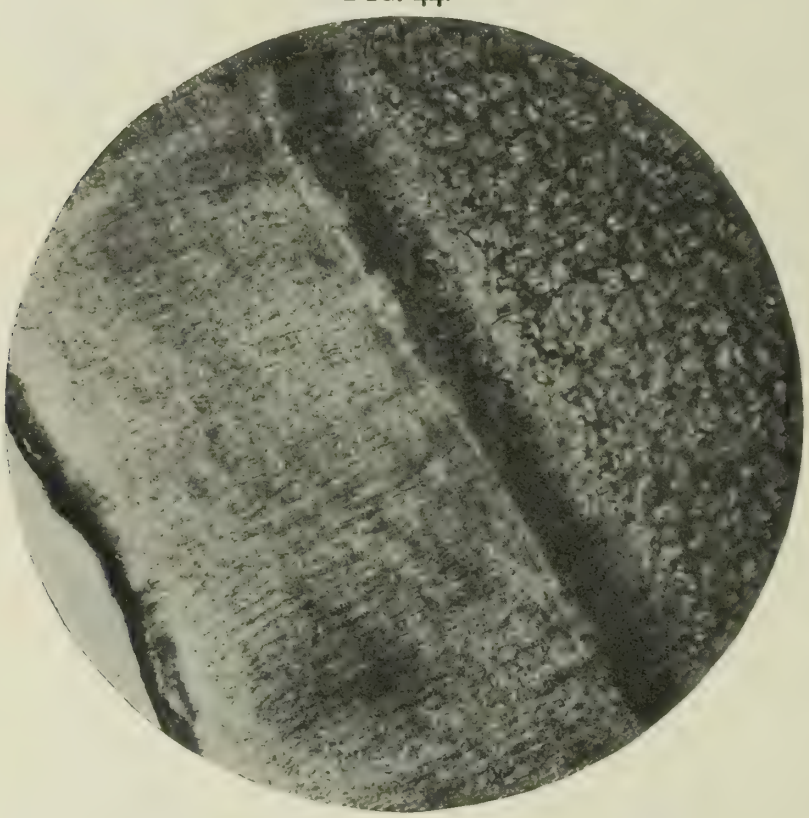


SECTION SHOWING INTERGLOBULAR SPACES IN DENTIN OF TOOTH OF AUSTRALIAN OPOSSUM.
× 250.

are powerfully refractive and shine like jewels, while the organic substructure beyond is very dull and dim. Both specimens were photographed while temporarily mounted with a loose cover glass. Unfortunately, the one shown in Fig. 45 was lost in the attempt to remount it, but the other one I still have.

I have decalcified more than two hundred specimens of enamel, but these two are the only ones in which I have obtained any trace of an organic substructure in fully formed enamel. This substructure corresponds perfectly with the organic matrix which I have previously shown as being formed by the ameloblasts, and it is, in structure and position, exactly the reverse of what has been claimed by Drs. Bödecker and Abbott. But it is true, however,

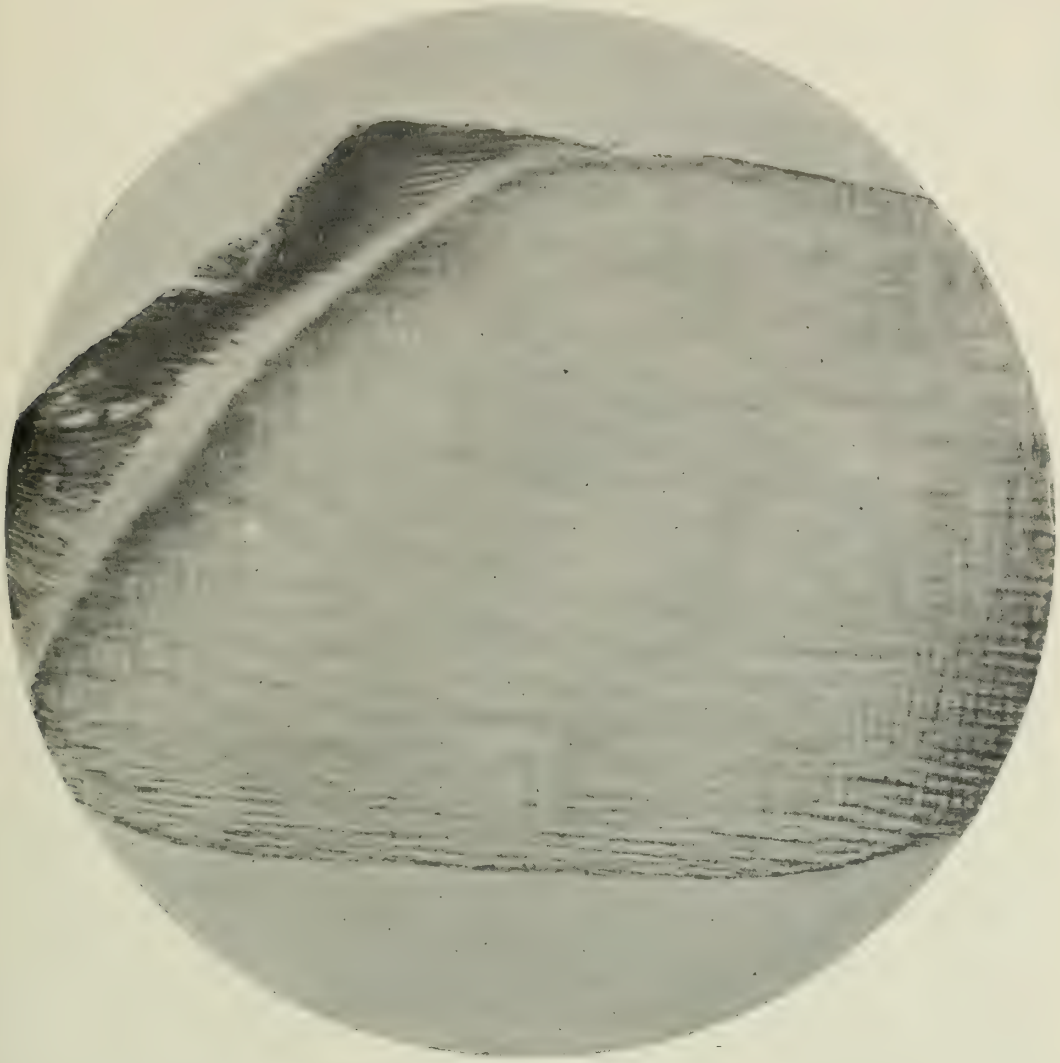
FIG. 44.



SECTION FROM TOOTH OF DUGONG, SHOWING IMPERFECTLY CALCIFIED DENTIN AND ENAMEL. × 250.

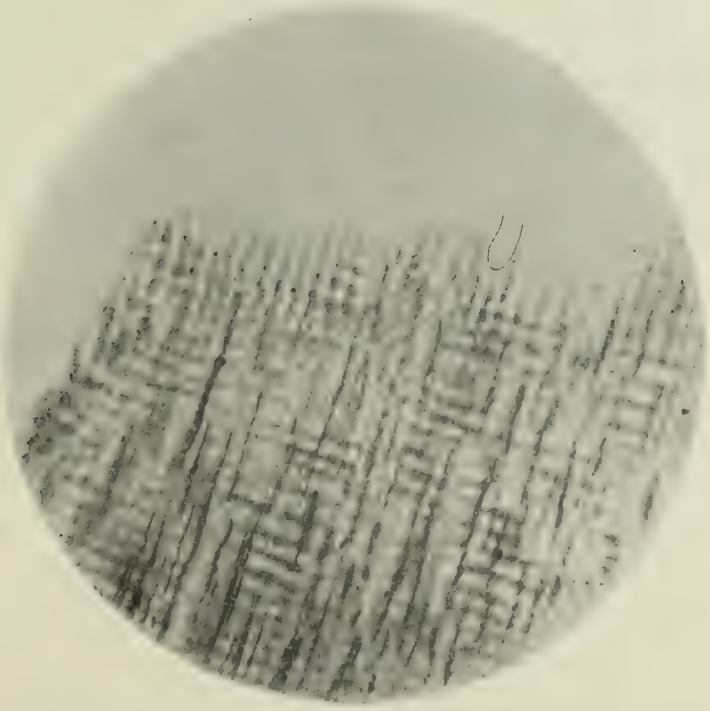
that there may sometimes be seen the appearance of a delicate fiber passing between the enamel-rods and sending out thorn-like branches into them. Fig. 47 is a photograph of enamel from the tooth of a South American rat (*Uromys macropus*). I selected the tooth of this little animal for showing this particular feature, because the enamel-rods are very distinct and clearly defined from the inter-rod substance. So far as I am aware, the appearance of a fiber with thorn-like projections between the enamel-rods has never before been so strikingly shown, certainly not in a photograph. I will not say that if Dr. Abbott or Dr. Bödecker had presented this photograph before this meeting, as a proof of their contention on this point, they would have converted all of you to their theories, but I think they would probably have staggered some of you and convinced not a few. It certainly does look like a convincing bit

FIG. 45.



SECTION OF HUMAN ENAMEL, NEARLY DECALCIFIED, SHOWING FIBROUS MATRIX. × 300.

FIG. 46.



SECTION OF HUMAN ENAMEL, SHOWING EFFECT OF DECALCIFICATION. × 400.
A fibrous matrix is seen at the ends of the enamel-rods where the calcium-salts have been completely removed.

of argument in their favor. But we really have here only the outward form and semblance of a truth, and so we must, perforce, consign it to that great limbo which has swallowed up so many human delusions. It is a mere appearance, intentionally produced in this instance by manipulating the rays of light which illuminated the section at the time of photographing it. The sub-stage condenser of the microscope was racked down a little to increase the shadow effect, and the light was thrown obliquely upon the enamel-rods,

FIG. 47.

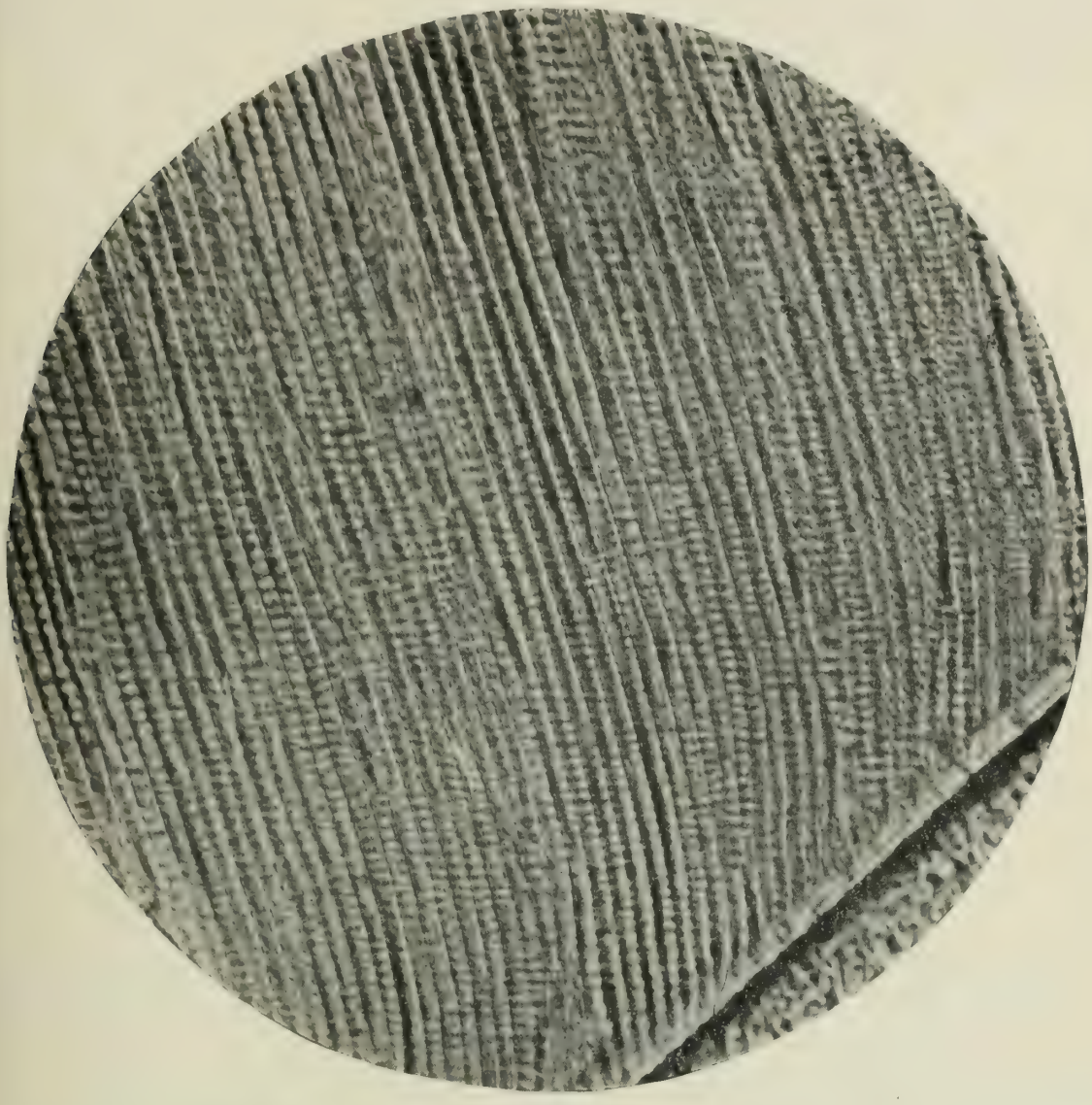


SECTION OF ENAMEL FROM TOOTH OF SOUTH AMERICAN RAT, SHOWING APPEARANCE OF FIBERS BETWEEN THE ENAMEL-RODS. × 800.

with the result that we have in the photograph a fine "diffraction" fiber. The thorn-like projections of the fiber are produced by the light breaking over the round edges of the enamel-globules of which the rods are built up. This manipulation of the condenser and the light is often resorted to by experienced histologists in their attempts to get different views of difficult subjects of study such as enamel is. It is also a method more frequently unconsciously used, with the result that wonderful discoveries are announced which nature is quite innocent of. In all critical tests of

structure a different method of procedure must be adopted. Fig. 48 embraces the same field and a little more than is shown in Fig. 47. The lens used was slightly lower in magnifying capacity, but with a power of resolution or definition of a little over 181,000 lines to the inch. This is very near the present limits of the resolving power of microscopic lenses. The condenser was placed in "critical" focus and a central light thrown on the field, with the result, as you see, that every trace of the famous "fiber" has disappeared.

FIG. 48.



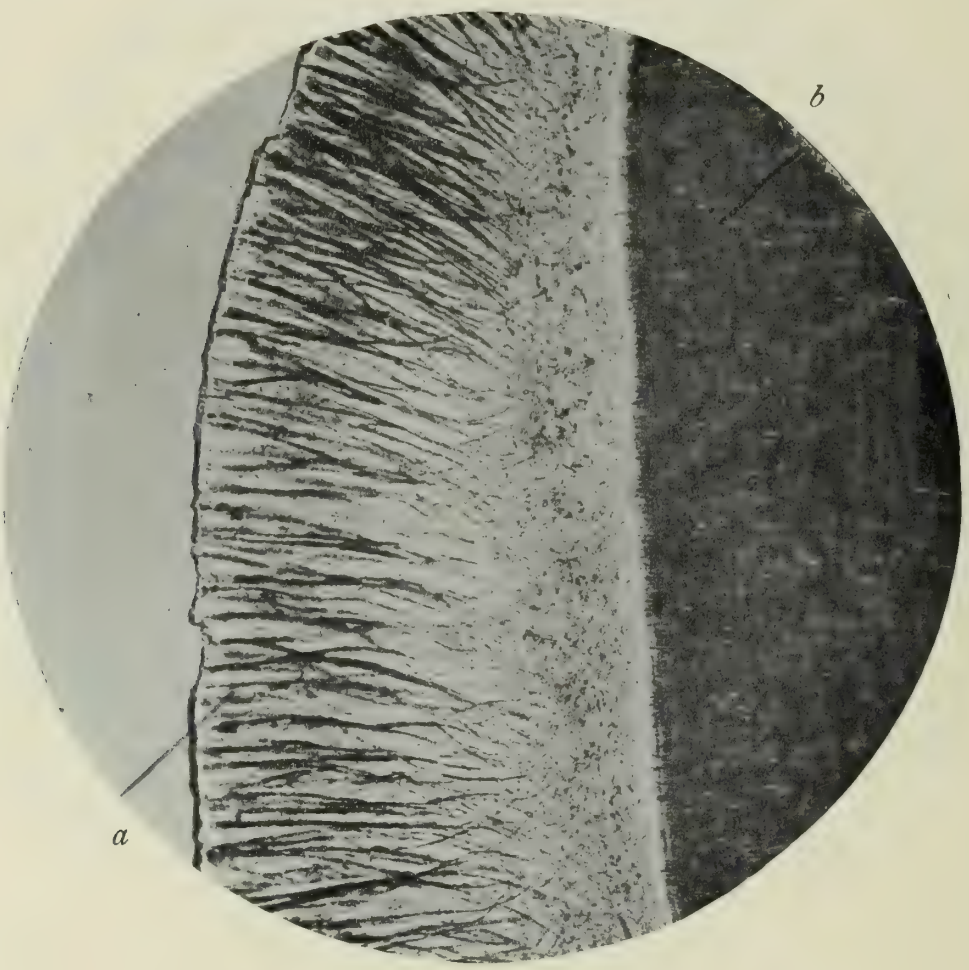
THE SAME FIELD AS SHOWN IN THE FOREGOING ILLUSTRATION. × 500.
Taken with a lens of lower magnifying, but higher resolving power, and with sub-stage condenser in "critical" focus and central illumination. All traces of the fibers shown in the preceding figure have disappeared.

This may serve not only as an explanation of Bödecker's enamel-fiber, but also as an illustration of one of the many technical difficulties which must be encountered in a critical microscopical study of enamel under high powers.

We are still far from having exhausted the subject of imperfections or variety in the minute structure of enamel, but we have taken a fairly general survey of the field. The facts brought out show that we may frequently find enamel of a markedly imperfect

structure which has run the gauntlet of time for fifty or sixty years, and is free from decay. We may frequently find markedly imperfect enamel in the teeth of animals which very rarely or never suffer from caries. We frequently find enamel decaying rapidly which, from every test that can be applied to it, seems perfect in structure and composition. In the face of an overwhelming mass of facts of this kind, I think the only logical conclusion that can be reached is that *in teeth which decay* faulty structure may be regarded somewhat in the light of a predisposing cause of caries, while imperfection of structure in teeth which do not decay cannot be so regarded. This is nearly equivalent to saying that railway

FIG. 49.



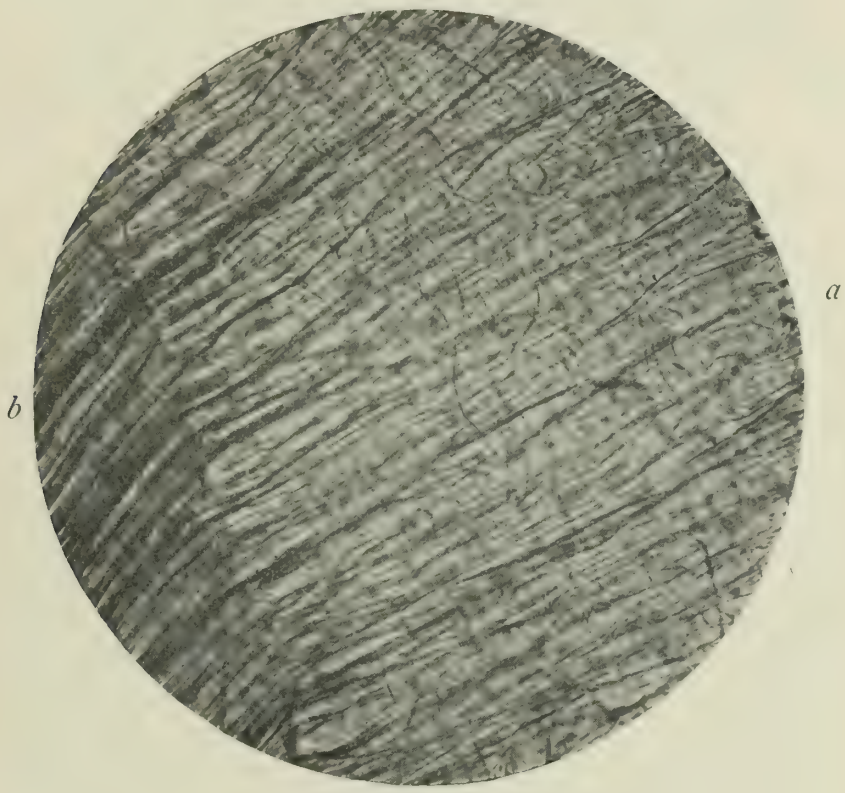
FROM SECTION OF TOOTH OF SARGUS. × 150.
Specimen from Mr. Charles Tomes's collection. *a*, Enamel; *b*, Dentin.

traveling, for instance, predisposes to nervous shock, concussion of the brain, or broken limbs *if the train goes off the track.* I have no wish to over- or under-estimate the value of any fact in this connection. My whole aim in this first part of my paper has been to show the proper value and the true relation of a series of facts that have hitherto been vastly over-estimated in considering the problem of dental caries.

The utmost, as it appears to me, that can be said upon the point is this: Any form of imperfection in enamel-structure which implies a deficiency of calcific material makes less work for the true de-

structive cause just to the extent of such deficiency. But it is simply not true that all rapidly decaying enamel is deficient in calcific material or otherwise imperfect in structure. The canals, channels, or tubes which we find in the teeth of the sargus, spherodus, pycnodus, and other recent and fossil fishes cannot be said to predispose to caries, because the conditions of the environment of these teeth are such that they never decay. But place enamel of such structure as is shown in Figs. 49 and 50 in the average human mouth, and it would doubtless decay much more rapidly than the same bulk of enamel from a human tooth, for the simple reason that bulk for bulk the enamel from the teeth of these fishes contains much less calcific material for acids to dissolve than is found in human

FIG. 50.



FROM SECTION OF FOSSIL TOOTH OF PYCNODUS. × 150.

a, Enamel; *b*, Dentin. The dentinal fibers are seen to pass into the enamel, some of them branching and turning abruptly to right and left, and others passing through the entire thickness of the tissue.

enamel, and also because channels and fissures of all sorts offer an increased surface for the acid of decay to act upon. In view of what has been previously demonstrated and of what is clearly shown in the illustrations accompanying this paper, I do not see how any one can take up any other position than this.

We will pass now to an examination of the active cause and the phenomena of caries of enamel. All previous writers have treated this subject very briefly, and have especially remarked the extreme difficulty they have experienced in preparing sections of carious enamel. Dr. Miller, while having most thoroughly worked out the problem of decay of dentin, gives only three pages in his valuable book to appearances under the microscope of enamel in decay. He says,—

"The preparation of specimens of enamel suited for a study of the process of decay is very difficult."

FIG. 51.



ANTERO-POSTERIOR SECTION OF UPPER HUMAN MOLAR. × 10.

FIG. 52.



SECTION THROUGH APPROXIMAL CAVITY SHOWN IN PRECEDING ILLUSTRATION. × 100.

His conclusions are that—

"The destruction of the enamel as it occurs in decay must be regarded as essentially a parasitico-chemical process. The loosening of the enamel-prisms is caused by acids concerning whose

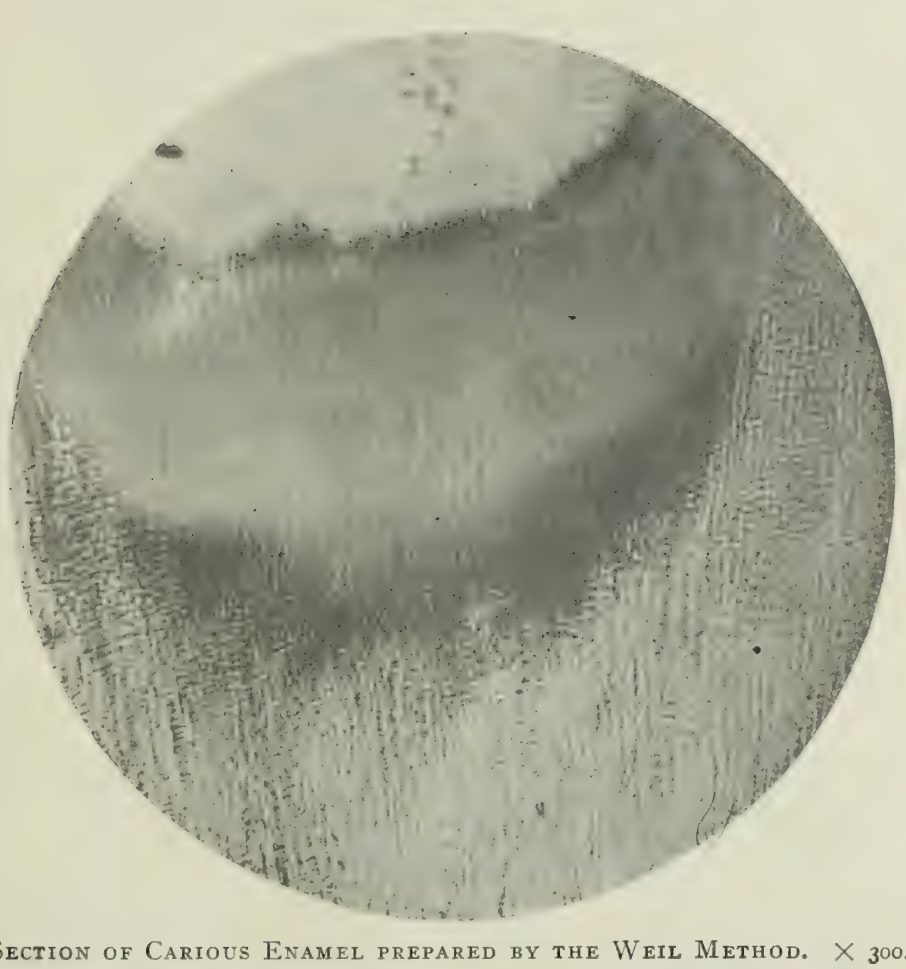
origin there can be no doubt; they arise in the mouth by fermentation of the carbohydrates. . . . The bacteria directly participate in the process, inasmuch as they invade the broken-down enamel, perhaps drive the prisms farther apart, and destroy the remnant of organic matter. Micro-organisms do not exert a direct influence on normal enamel."

Mr. Henry Sewill in treating this subject in his book says,—

"To cut a section of carious enamel sufficiently thin for examination under high microscopical power is impossible."

Wedl, in the "Atlas of Dental Pathology," gives but one illustration of the appearances of carious enamel under high magnifying

FIG. 53.



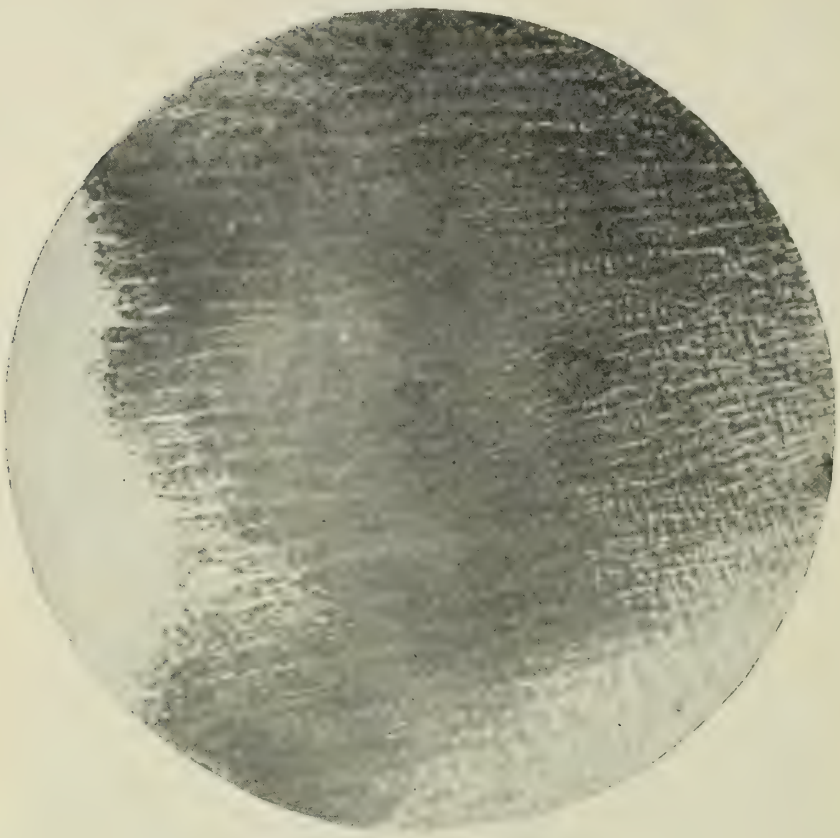
SECTION OF CARIOUS ENAMEL PREPARED BY THE WEIL METHOD. × 300.

The deep natural stain and the general appearance of the enamel indicates very slow decay. In printing, the thinnest part of the negative, where the stain was deepest, has been "blocked out" to prevent entire loss of detail at this part. It is seen that the enamel-rods are not broken down in this deeply-stained part and that there is no granular layer. The only appearance of this sort is on the surface of the cavity, where a thick mass of bacteria is shown.

power, and that one shows nothing of the process by which the disintegration or staining of the tissue is brought about. The only illustration on this point in the last edition of Mr. Charles Tomes's "Dental Surgery" is a reproduction of the engraving which accompanied Dr. Abbott's article on the subject in the DENTAL COSMOS in 1879.

Mr. Tomes's conclusion concerning the process of caries is in harmony with those of the most advanced investigators and writers

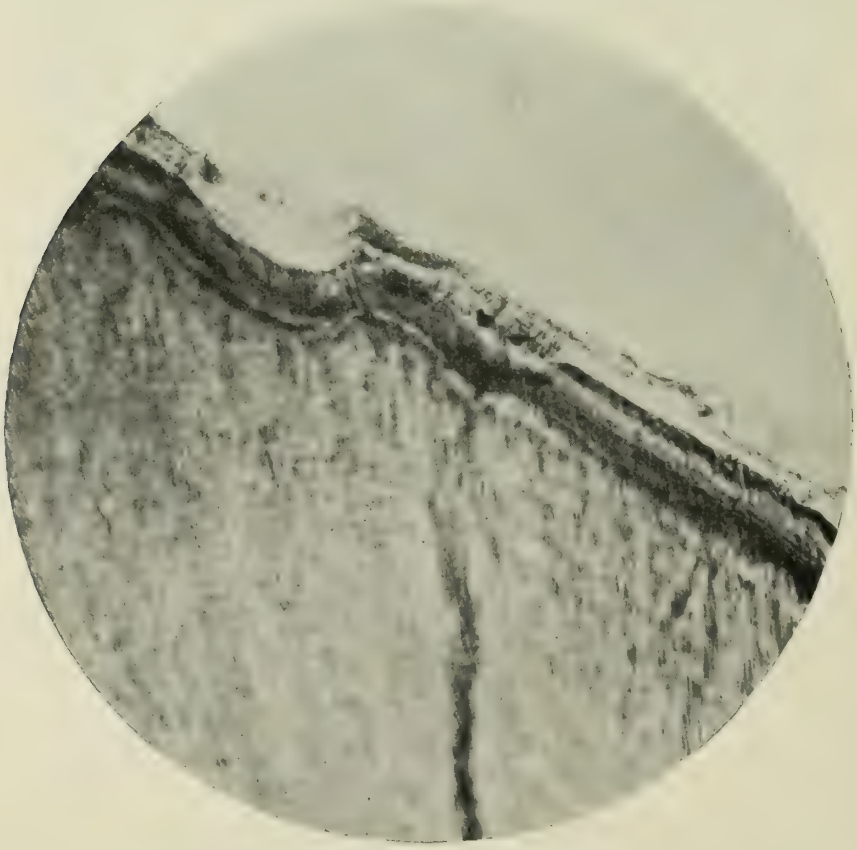
FIG. 54.



FROM A SECTION OF CARIOUS ENAMEL. × 800.

The mass of micro-organisms, which has often been spoken of as a granular layer of decomposing enamel, has been torn away from the surface in mounting.

FIG. 55.



SECTION OF HUMAN ENAMEL, SHOWING COMMENCEMENT OF CARIES. × 250.

in this field, which is that it "is due to the solvent action of acids which have been generated by fermentation going on in the mouth, organisms having no small share in the matter."

There are no drawings or photographs of carious enamel in "The American System of Dentistry." Dr. Black's contribution to this work is a masterly presentation of the argument, and a lucid summing up of the whole subject, but it contains no definite statement as to the exact process of the inception of caries. Dr. Abbott, who says that he has studied this subject more or less continuously for sixteen years, gives in his recently published work on "Dental Pathology and Practice" the engraving to which I have already re-

FIG. 56.

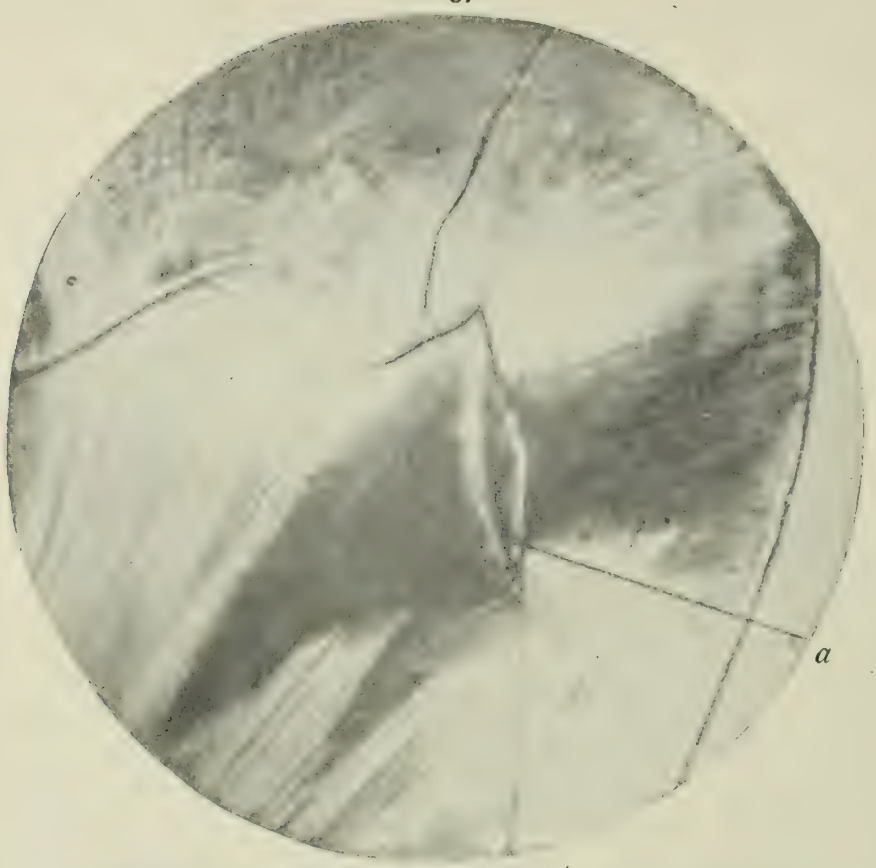


SECTION OF HUMAN BICUSPID, SHOWING COMMENCEMENT OF CARIES. × 12.
a and a^1. Appearances caused in enamel and dentin by the acid of decay; *b* and b^2, Shreds of a felt-like mass of bacteria raised from the surface of the enamel; *c*, A cavity, more distinctly shown in the illustration following this.

ferred and one photograph of decaying enamel, but neither of these conveys any information as to the real cause of caries. His conclusion, however, is that micro-organisms "do not play any important part in the process of caries, at least, do not materially interfere with the tooth in its normal condition." This opinion, judging from the context, is based upon the fact that no micro-organisms are shown in the drawing or, presumably, in the specimen from which the drawing was made.

The references which I have mentioned sufficiently indicate the present information and opinions on the subject, and I doubt if it

FIG. 57.



STAINED AREA OF ENAMEL AND DENTIN SHOWN AT *a* IN THE PRECEDING ILLUSTRATION. × 50.

a, A cavity which has been formed by the acid of decay at the line of union of the enamel and dentin. The only means of communication between this cavity and the surface of the enamel is through the microscopic canals formed in the enamel by acid excreted on the surface by bacteria.

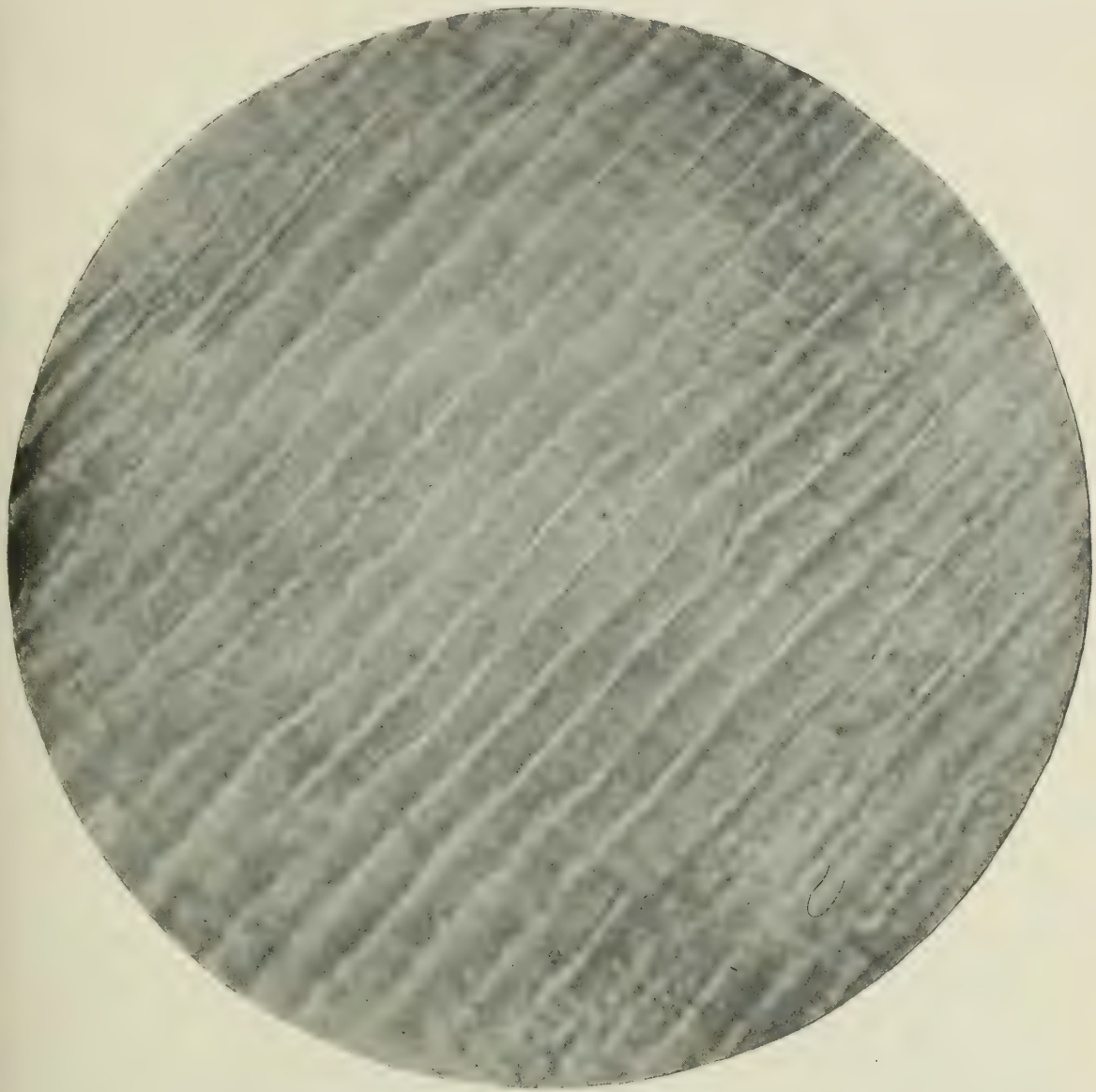
FIG. 58.



SHOWING CAVITY, SEEN AT *a* IN PRECEDING ILLUSTRATION, NEARLY FILLED WITH PARTLY DECALCIFIED BITS OF ENAMEL AND THE DEBRIS OF DECAY. × 250.

is possible to obtain any further information from specimens prepared in the usual way. Fig. 51 is a photograph of an antero-posterior section of an upper molar showing the commencement of caries of the enamel on the grinding and approximal surfaces. If the small approximal cavity be examined under a power of two hundred and fifty diameters we have such appearances as are shown in Fig. 52, and which have been described in most of the text-books treating the subject. One notes the usual staining of

FIG. 59.

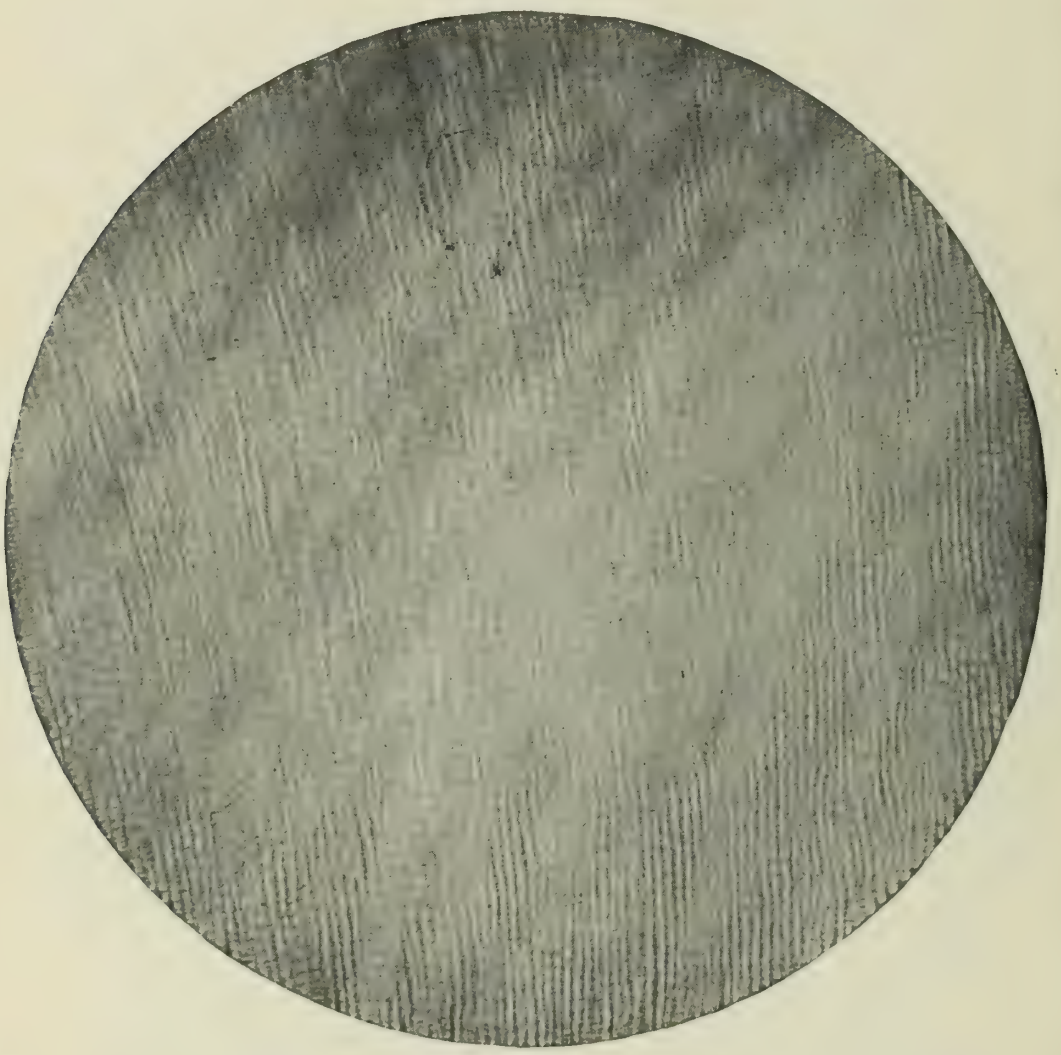


SHOWING CHANNELS OR CANALS BETWEEN THE ENAMEL-RODS FROM THE TERRITORY SHOWN AT *a* IN FIG. 56. × 1000.

the enamel and the marked definition of the rods and the sections of which they are composed as the result of the penetration of some acid. On the margin of the cavity is seen what has sometimes been described as the granular layer of nearly decomposed enamel. Fig. 53 shows a section of deeply pigmented, slowly decaying enamel. It is seen that the rods do not at any point break down into a granular appearance. The ends of the rods which form the floor of the cavity have the usual appearance of enamel which is being acted upon by acids. The granular appearance

above the enamel is caused by a mass of unstained bacteria which lines the cavity. More frequently than otherwise this so-called granular layer is absent, as in Fig. 54, which shows the border of decaying enamel as magnified about one thousand diameters. In this specimen we observe that the cement-substance between the rods and also between the globular bodies or sections of the rods has been partly removed by acids, which have evidently penetrated deeply into the substance of the enamel. On completing our

FIG. 60.



SECTION OF HUMAN ENAMEL, NORMAL, SHOWING EFFECT OF ACTION OF LACTIC ACID. × 200.

study of this specimen we can say with Dr. Abbott that "not a trace of micrococci or leptothrix is visible in or above the decayed pit of enamel."

When I began the study of this subject I examined several hundred specimens of decaying enamel mounted by the most expert preparers in this kind of work. I saw, as one might expect, a great variety of appearances, but nothing to indicate the exact manner in which those appearances were produced. On attempting to grind sections I found, as Dr. Miller and others have stated, that it was an extremely difficult task to get sections of carious enamel sufficiently thin for study under high powers. In examining com-

paratively thick sections in water or glycerol during the process of grinding, I often saw that the cavities in carious enamel were lined with micro-organisms, but if I succeeded in getting the section sufficiently thin and mounted in balsam I found that all traces of the bacteria had usually completely disappeared. Occasionally, in specimens selected to show the beginning of caries, such appearances were seen as are shown in Fig. 55. A slight amount of enamel at one point has been destroyed, and on each side of this Nasmyth's membrane is shown raised from the surface of the tooth and, adhering to the membrane in places, what appear to be bits of partly decomposed enamel. This is the most interesting and instructive balsam-mounted section of the commencement of caries

FIG. 61.



SECTION OF NORMAL HUMAN ENAMEL FROM APPROXIMAL SURFACE OF BICUSPID, SHOWING MICRO-ORGANISMS ATTACHED TO NASMYTH'S MEMBRANE. × 200.

that I have ever seen. It perfectly illustrates the statements of various authors to which I have referred, that caries of the enamel is caused by acids generated in the mouth. Experiments out of the mouth with acids demonstrate that Nasmyth's membrane may be raised so as to produce appearances almost identical with what is shown here. This, however, does not bring us much nearer a solution of the problem. As I was preparing this particular specimen I saw that the little depression shown on the left was filled with leptothrix and thread-like forms of micro-organisms, and the question which has often been asked, but never satisfactorily answered, at once occurred to me: Were the bacteria present merely as an accident because they found in some congenitally defective spot, or in a depression caused by the action of free acids

in the mouth, the opportunity for undisturbed development, or was the defective spot in which they were seen solely caused by them?

A very interesting and suggestive fact was several times observed near the commencement of this work; it was that decay often seemed to be rapidly progressing where the enamel was most perfect, while various defective spots in the tooth well calculated to offer points of attack for free acids had been passed over. The appearances, especially such as show the sharply circumscribed area to which I have called your attention, all indicated that decay was *the result of some specific cause acting continuously at some par-*

FIG. 62.

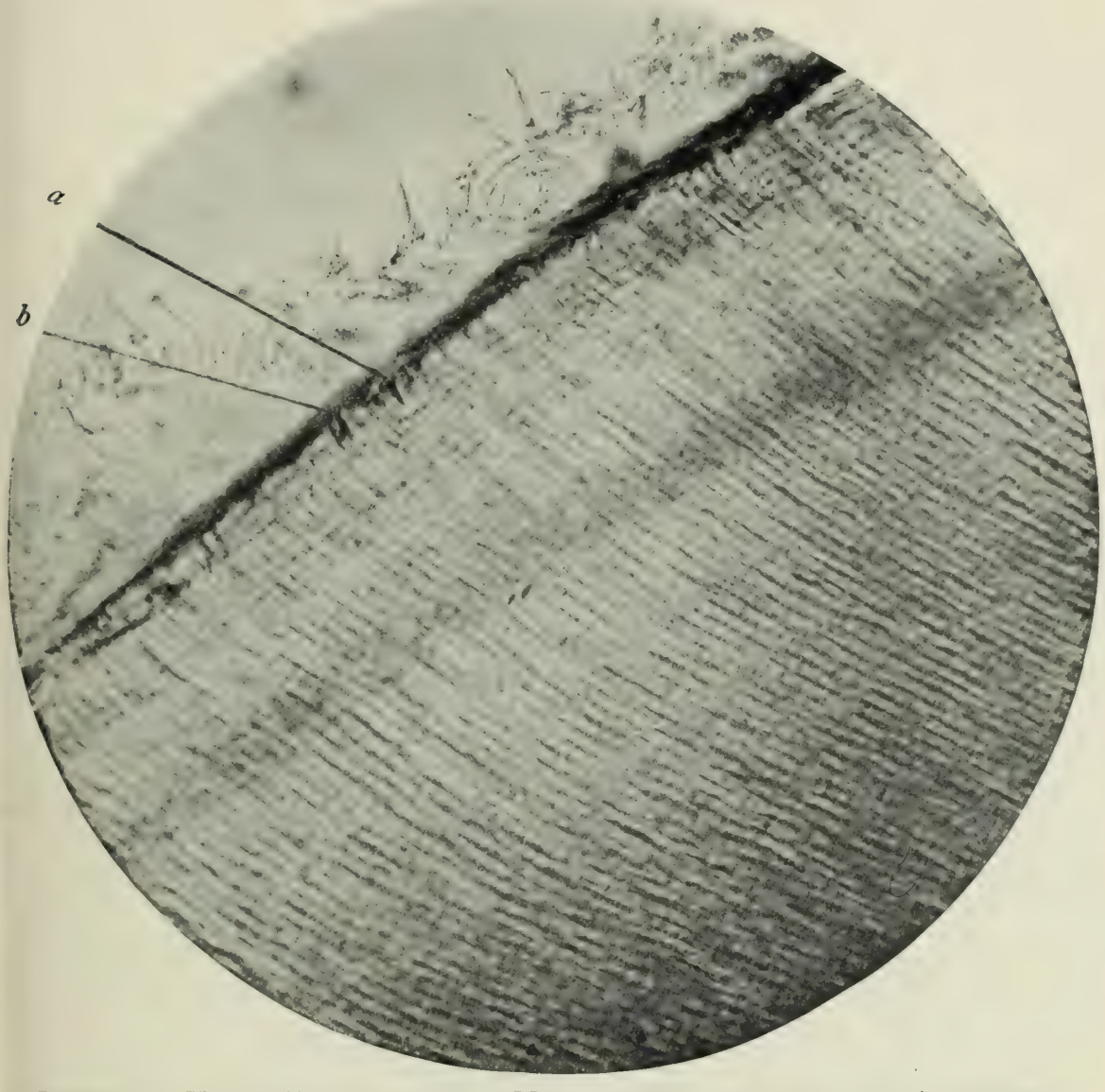


SECTION OF NORMAL HUMAN ENAMEL. × 350.
Showing thick, felt-like mass of micro-organisms slightly raised from the surface of the tissue by pressure of the cover-glass in mounting.

ticular point in a manner impossible to free acids in the mouth. Being convinced of this, I set about devising some method of grinding thin sections with the least possible disturbance to the partially decomposed enamel or to anything that might be attached to its surface. The Weil-Koch method, which I tried thoroughly, gave me only mediocre results. It consumes much time, and it necessitates the treatment necessary for mounting in balsam,—an almost fatal objection for this particular kind of work from my point of view. To the discovery of a simple and effective method of grinding specimens whereby sections of carious enamel can be prepared in ten or fifteen minutes sufficiently thin for examination under the

highest powers, is due whatever of interest the following part of this paper may contain. Many of the sections from which the photographs were made are less than half the thickness of the paper used in the DENTAL COSMOS. To this extreme thinness is also added the perfect preservation of every feature of the processes of decay. The teeth from which the specimens were made were placed, immediately after extraction, in a fixing and preserving

FIG. 63.



SECTION OF HUMAN ENAMEL SHOWING MICRO-ORGANISMS ATTACHED TO APPROXIMAL SURFACE OF MOLAR TOOTH. × 200.

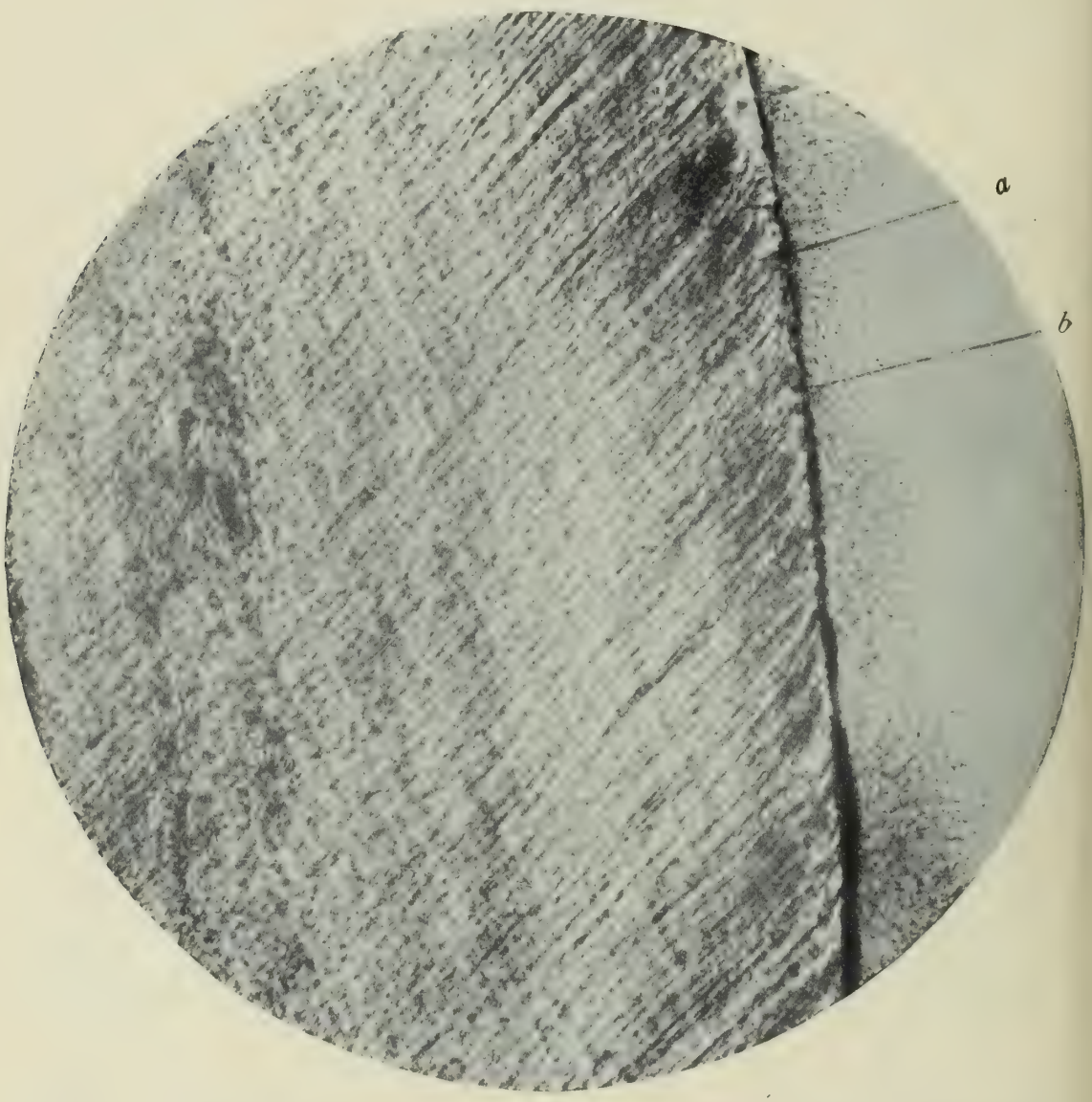
a, *b*, shows commencement of the process of caries by solution of the cement-substance.

fluid. The sections were all ground under water and the most of them mounted in spirit and glycerol, thereby insuring the utmost naturalness of appearance and freedom from shrinkage.

During the past two years I have ground more than four hundred sections of enamel in every stage of decay from teeth of almost every description, some of which have been sent from different parts of the world. In one respect every specimen has shown precisely the same appearance. Lining the cavities or covering the surface where decay has commenced there is always to be seen a

thick felt-like mass of acid-forming micro-organisms. *This mass of fungi is so dense and adhesive as to make it highly improbable that the enamel is affected, except in rare or special instances, by any acid other than that which is being excreted by the bacteria at the very point where they are attached to the enamel.* The thick glutinous-like mass of fungi also prevents the excreted acid from being washed away, so it exerts its full chemical power upon the calcific tissue.

FIG. 64.



SECTION OF HUMAN ENAMEL SHOWING MICRO-ORGANISMS ATTACHED TO APPROXIMAL SURFACE OF BICUSPID. × 200.

a, *b*, shows commencement of caries by solution of cement-substance between the enamel-rods.

The appearances of enamel at the commencement of decay are very strikingly shown in Fig. 56, from a section of a lower bicuspid. This is a particularly interesting specimen from several points of view. It came from the mouth of a woman thirty-five years of age, who had suffered but little from caries, although the teeth had been poorly cared for. The patient returned to me after a year and a half with the teeth in a very bad condition. A marked change in systemic health was noted, and the traces of acid fer-

mentation in the mouth were very evident. On both sides of the lower jaw the second bicuspid and first molar were decayed beyond the possibility of restoration. I removed the remains of these teeth preparatory to making a plate, and as the first bicuspid on one side stood outside of the arch, and at an angle which would have interfered with the fit of the proposed plate, I removed that also. Although somewhat stained, it appeared to be perfectly sound. I afterward ground a section of it, with the result which you see in the illustration shown. The tooth, which was without

FIG. 65.



SECTION OF HUMAN ENAMEL. × 350.
Showing deeply-stained mass of micro-organisms attached to the surface, and further action of acid in dissolving the cement-substance and forming V-shaped spaces between the enamel-rods.

opposing teeth in the upper jaw, was literally covered with a thick growth of micro-organisms. The acid products of these fungi had softened the entire crown of the tooth in several places, penetrating both enamel and dentin, although there was not a trace of a cavity to be seen on the external surface.

Let us examine the spot on the approximal surface, shown at *a* in Fig. 56, under a higher magnifying power (see Fig. 57). A re-

markable fact is revealed in this illustration. We observe that while there is no actual breaking down of tissue on the surface, yet the destructive agent, which has caused discoloration and penetrated the entire thickness of the enamel, has produced a cavity of considerable dimensions at the line of union of the dentin and enamel. Under still higher power (Fig. 58) we find that the cavity on the border of the dentin is partly filled with loose and decomposing particles of enamel. An acid, for nothing else could have produced this effect, has penetrated the enamel and accumu-

FIG. 66.

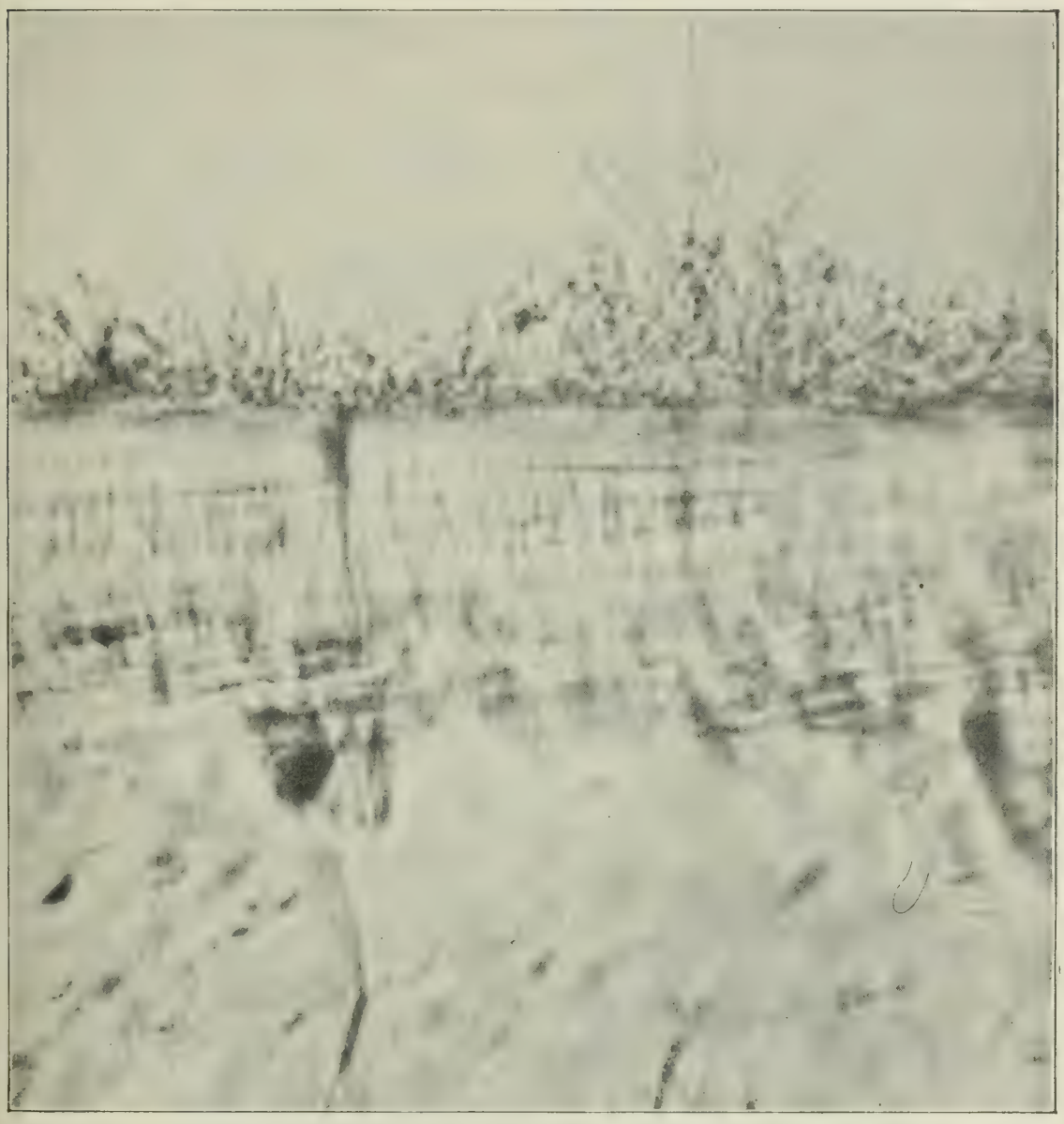


SECTION OF HUMAN ENAMEL, APPROXIMAL SURFACE OF CUSPID. × 300.
Showing marked effect of acid excreted by micro-organisms attached to the surface.

lated in some congenitally defective spot, at the line of union of the tissues where such places are most frequently found, and has enlarged what was probably but a microscopic area at the beginning into a cavity of sufficient size to be seen by the unaided eye after grinding the section. If we examine the section in any part of the stained area shown at *a*, Fig. 56, we find the cement-substance which united the enamel-rods has been dissolved out until canals of considerable size have been formed between the rods (see Fig.

59). Down the canals thus formed the acid has penetrated to the cavity beneath. Experiments on sections of sound enamel out of the mouth show that effects substantially identical with those seen in the specimens just exhibited can be produced by the action of acids (see Fig. 60), the first action of the acids being to separate the rods, and, usually, also the globular bodies or sections of which the rods are composed, by solution of the cement-substance.

Fig. 67.



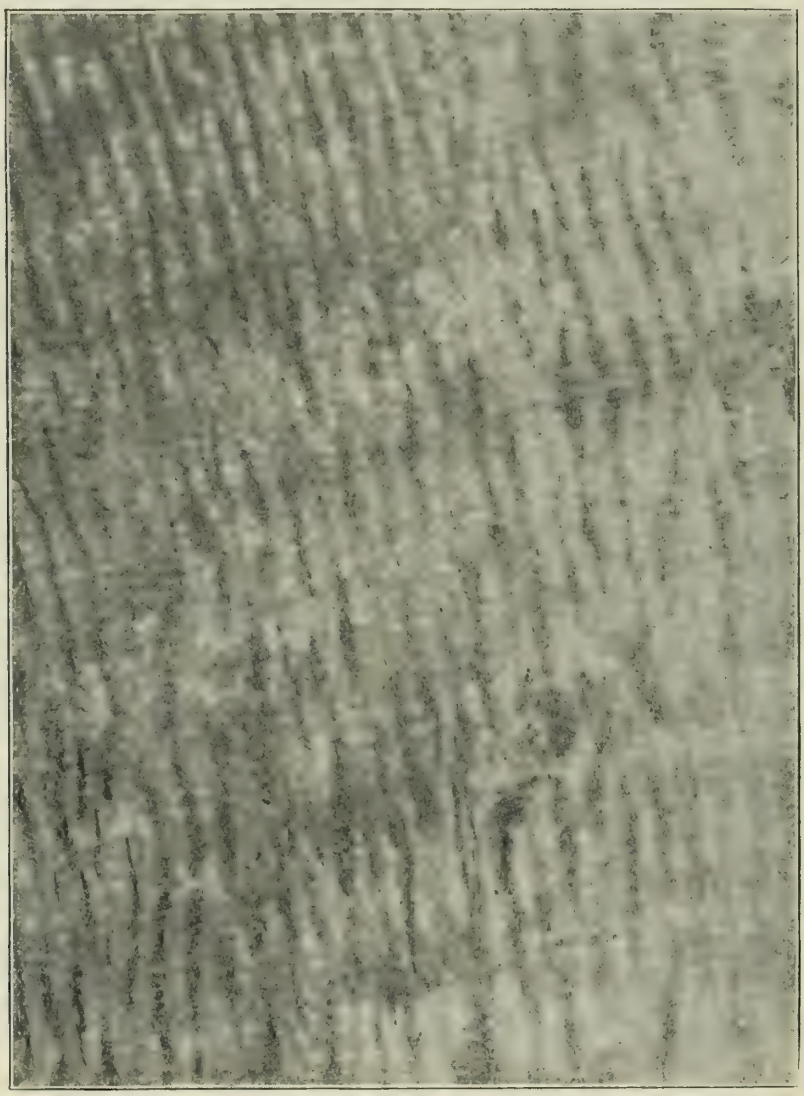
A Portion of the Preceding Illustration. × 800.
Shows fibrous substructure of enamel by solution of lime-salts near the surface of the tissue.

The condition of the tooth shown in Fig. 56 gives us a most complete explanation of what has been wrongfully interpreted as a retrograde metamorphosis of enamel. We see that the change which has been thus interpreted is entirely caused by an agent penetrating from without. The tissue thus softened by the action of an acid cuts much more easily than normal enamel, and so we have another illustration of the fact that observation is often correct, while the forced and arbitrary interpretation sometimes given of

the cause of the phenomena observed is often radically wrong. In this connection I commend to your attention the editorial remarks in the December issue of the Cosmos on the practical value of scientific research. If the real cause of the softening of enamel so often observed had been known, thousands of patients would have been spared the annoyance and often the injury of being treated with phosphates and phosphatic foods in the belief that such treatment would improve and harden the enamel of their teeth.

Fig. 61 shows a mass of bacteria attached to Nasmyth's membrane on the approximal surface of a bicuspid tooth. At the ex-

Fig. 68.



Section of Human Enamel nearly Decalcified by Rapid "White Decay." The Fibrous Substructure of Enamel finely shown. × 600.

treme left of the view the membrane is seen to be partly destroyed and slightly raised from the enamel, which, at this point, has already been attacked by the acid. The structure of the enamel on the surface is quite normal. In Fig. 62 the complete destruction of Nasmyth's membrane has been effected and the first attack made on the enamel, as shown by the fibrous appearance of the extreme edge of the tissue. The thick mass of micro-organisms is more easily raised from the surface of the enamel at this stage than

at any other. Pressure upon the cover-glass in mounting the specimen will nearly always cause such a separation as is shown here. At the same time the mass of bacteria are strongly adherent to each other.

Fig. 63 is in every respect a typical specimen showing the action of bacteria in their attack upon perfectly formed enamel.

There is no depression, pit, groove, or imperfection of any sort at the point of attack, but everywhere along the surface the cement-substance between the enamel-rods is being dissolved away, and one sees the beginning of the formation of those V-shaped spaces which mark the first step in enamel decay. This is the usual method of attack on approximal surfaces where the tissue is generally perfect. In Fig. 64 the same appearances are seen, the V-shaped spaces on the surface being clearly shown, although the structure of the tissue is even finer than in the preceding specimen. If the bacteria are stained and the specimen examined under high power, the V-shaped spaces or fissures are more plainly seen (Fig. 65). The micro-organisms in this specimen have intentionally been left deeply saturated with the stain and the focus adjusted on the exact surface of the enamel, so as to show the bacteria entering the fissures which have been produced by the acid. These crevasses are rarely so marked after the surface layers of enamel have been destroyed. The surface layers, or what is sometimes called the cortical layer of enamel, seem generally to be much denser in structure than the deeper parts of the tissue, and this explains the difference in the action of the acid which is sometimes observed at this point.

Differences in the structure of enamel produce a great variety of carious appearances. In Fig. 66, for instance, the enamel is seen to be very porous in structure and everywhere permeated by canals which pass between the enamel-rods. Here one can plainly see just how far the acid has advanced, dissolving out the cement-substance to a considerable depth before the structure of the rods has commenced to break down at the surface. The action of the acid has also very clearly brought out the character of the fibrous substructure of the enamel, which is always more marked in the outer cortical layer than elsewhere (see Fig. 67). If any one still has doubts concerning the fibrous substructure of enamel, let him study Fig. 68, which is from a section of very rapid white decay of enamel. In this specimen the cement-substance is almost completely removed, and there remain the fibrous and globular products of the ameloblasts precisely as I have described these features in my previous papers on enamel formation.

(To be continued.)

Abstract of Present Office Practice.

BY S. B. PALMER, M.D.S., SYRACUSE, N. Y.

(Read before the Eighth District Dental Society of New York.)

It is an honor which I fully appreciate to be counted worthy of writing a paper for discussion on this occasion. Limit of time, length of paper, and pressure of matter will excuse further introduction.

Your Business Committee gave freedom of selection of topic, and asked pardon for suggesting that "the paper should not be too deep, knowing our inability to discuss such a paper." I have acted upon the suggestion as far as would be prudent, and not *react* upon your inability. The matter to be presented is intended to show harmony between Science and Practice,—a summary of conclusions evolved from principles enunciated by the writer in a paper read before the Dental Society of the State of New York, in 1874, which principles came to be known as the Electro-chemical Theory. In order to condense the portion relating to general practice, the terms being familiar to all, this writing will be in skeleton form.

We find before us a large number of letters which have been answered relative to suggestions which have come to the notice of readers of dental journals. This correspondence has become taxing. As there are no books of reference or articles up to present conclusions, I take the liberty of laying the whole matter before you, and should the paper be published, with your approval, through reprints and marked passages, most questions in future could be answered. A summary of practice, even limited as this will be to points still under discussion, must necessarily contain many short explanations, and it becomes necessary to have some systematic order, or we will fall into the too common error of blending causes, mixing conditions, and thus lose sight of effects.

The first principle and main one—*the* one which has caused the writer the most study and anxiety—was set forth in the paper mentioned, and subsequently was laid in the foundation of "The New Departure." We had at that time "Principles and Practice" in book form, but discussions soon reversed the rendering, and for years it was "Practice *versus* Principles." The objective point was that the principles given favored amalgam, and gave to it antiseptic properties not credited to gold. The new doctrine was declared "degrading to the profession," a charge felt most keenly by the writer. Evolution in practice has rolled the cloud away, and to-day we have truly "Principles and Practice" working together harmoniously. Now, gold and amalgam stand upon their merits.

Our younger members may not distinctly know the claims put in for amalgam at the time mentioned. In fact, the first mention of the antiseptic principle was made in favor of tin, knowing that tin was recognized as superior to gold in low-grade dentin. Tin imparts stannic oxid to the dentin, and slight imperfections between the plug and tooth-structure which arrest decay. That is recog-

nized to-day. The same principle applied to amalgam, and its advocates were not slow to make it known; thus, the prejudice against the theory. Considering the prejudices that were then held against amalgam, and not less that gold was tried and found wanting under conditions well known to-day, we forgive those who defended established practice, in the belief that this heretical doctrine should be put down for the good of the profession. We have lived to see harmony restored, and are permitted to address a new generation of dentists. And, in a degree, this also applies to teachers.

First, we will define the principles or benefits claimed for amalgam, which gold does not possess, which was that the oxids and sulfids of the metal enter the dentin, and thus equalize potential between the filling and organic matter of soft dentin; where there is no difference in potential, that is, no positive or negative elements, there will be no current; without the current there would be no dissolving of lime-salts from acids unless the filling leaked, in which case acids would be evolved by the well-understood process of fermentation.

It has been my highest aim to make this a scientific and practical paper,—one to which I can refer in answer to questions, as hereinbefore stated. I will give an abstract of my scientific conclusions resulting from investigations commenced in 1848, and given to the profession in 1874, which, as some of those present remember, have been topics for earnest discussion until now. During the first decade there was an unpleasant clash between "principles and practice." Let that rest.

All that I have accomplished by investigation and observation up to the present time stands recorded in a sacred journal,—my own practice,—which of course harmonizes with the principles proclaimed. I mention my practice as a record, the outcome of a life-work, not as an unfailing proof of my conclusions.

What is dental science relating to filling teeth? It consists of a knowledge of cause and effect applied to the materials used for filling and their combinations, and the adaptability of filling-materials to tooth-structure. In so far as this knowledge is scientific it is practical. Should any operator become possessed of this knowledge, by observation, practice, and experience, if free from error, it would be scientific knowledge. Science is truth, and when used to survey lines between causes and their effects, the latter is reached without variation. More time is required, with great risk of error, to obtain accurate knowledge over ordinary practice.

Gentlemen, for fear that I may go too deeply into science, let us make a practical illustration of scientific teaching, which will give to you the answers recently given to a correspondent who wished to know what benefits arise from washing amalgam. To show that such answers are in demand I quote from the December issue of the *International Dental Journal*, giving the discussion at a meeting of the American Academy of Dental Science, which was held in Boston, May, 1896. The question was: "To what extent is the washing of amalgam masses an important feature in the production

of a good filling?" We quote from a distinguished member sufficient to show the general understanding of this subject.

The above question was one of a number formulated by the American Dental Association. The plan was to discuss the questions and send answers to the association. After a discussion of three pages the following answer was adopted: "That the society wishes to express itself as being undetermined as to whether amalgams are improved to any extent by washing or not."

It would be a help to a young practitioner to refer to his lecture notes, and read: "Washing amalgam produces more perfect amalgamation, and makes a finer and smoother filling; it also lessens the tendency of amalgam to shrink or change its form."

At present there are two principles implied in the application of amalgam for tooth preservation. One is dependent upon the metallic salts which are absorbed into the dentin; and the other is filling the dentin by cavity-lining, as a substitute for oxids. For the former use amalgam unwashed, because it contains more oxid and the plugs oxidize readily when the surface is in contact with dentin. Washing amalgam produces this change. It brightens the surface of the cutting as soldering acid does metal to be soldered. The mercury readily covers every particle, which renders it quick-setting. It forms a solid mass as ach portion is soldered to another or others, and is not as liable to change its form as though amalgamation was imperfect on account of the cuttings being oxidized. It makes a smooth working mass, because each particle slides easily upon others, and it gives a bright clean surface.

Thus, by dividing the question and making applications to specific conditions, knowledge is gained. Before leaving the subject of amalgam, we will answer another question:

"You mention lining cavities with tin foil for amalgam fillings: Is it better than cement, and what is the difference?"

It is no better than cement, nor as good for frail walls. Cement adheres firmly to both dentin and amalgam. Tin linings do not adhere so closely to the walls of the cavity. It preserves the tooth upon the same principle as amalgam alone. It presents a lining of tin amalgam to the dentin which does not discolor like the sulfid of silver from amalgam. It prevents what is often mistaken for shrinkage of amalgam, which in reality is caused by local currents upon the surfaces of the plug and not from within. Every cutting of alloy that is not fully amalgamated (and all are not) is a negative element in touch with the amalgamated portions. This accounts for the roughened appearances of old fillings which have come out. The portions which contain most mercury have been dissolved by such currents. This condition occurs when the action of the current dissolves the lime element and thus enlarges the cavity instead of filling the dentin, which reduces the action. Tin unites the contending elements and presents but tin amalgam to the dentin. Cement and varnish have superseded tin of late.

I have recently received a letter asking as follows: "Have you found any means of combining amalgam scraps with newly-mixed

to make a better filling,—one that could be fully hardened and finished at first sitting of patient?" It would hasten setting, but for reasons given above the plug would contain more positive elements than a new mix. The scraps would take up mercury more readily than the new alloy, which would hasten setting, but the filling would have little edge-strength and the scraps would dissolve faster than the new, which would leave uneven surfaces. For quick-setting amalgam, cast an ingot from any high-grade formula and cut from it as wanted for rapid setting. By washing it will set as rapidly as cement, and become hard in about the same time.

Another letter asks, "When the bottom of a cavity with four walls (continuous), pulp alive, is filled with tin and perfectly capped with gold, is there any galvanic action between the two metals, or between the filling as a whole and the interior of the cavity?" Both metals are influenced by contact, but no current is perceptible; none leaves the filling to enter the dentin. Such a filling is better than one of all gold, or all tin. The effect on the tin is to render it more positive or nearer in potential to tooth-structure; besides, the tin furnishes the stannic oxid as an antiseptic. Approximal fillings in bicuspids extending upon the coronal surface are greatly improved by tin as guard filling at the cervical border.

Again: "Is there galvanic action between gold or tin when used for separate fillings and enamel?" No action between two fillings of the same metal. None to show or do harm between gold and tin. Between gold and amalgam there is vigorous action when first filled; but little after the amalgam turns dark. The enamel is not affected between fillings when separated by the thickness of a dime or more. Nearer than that it is better practice to cut away the enamel and make a bold connection, for reasons above given. But for experience gained in study of oral electricity in my own mouth, I could have had no knowledge of these minor points. The influence of gold upon fillings was learned from having a second superior molar which was clasped with gold, clasps extending near the crown of the tooth. In the center of the crown was a medium-sized cavity surrounded with firm enamel border, cavity not deep. This cavity was filled and refilled for experimental and scientific purposes, as often as desired. The peculiar advantages were, the gold clasp always afforded a negative element by which to test any filling placed in the cavity. The tip of the tongue covering the crown would also touch the gold and convey a current to the filling, as the taste indicated. When filled with gold there was no indication of current. With tin none without the aid of carbon, or a metallic conductor. Amalgam always gave evidence. The last test was with copper amalgam, and for some weeks was quite unpleasant, but disappeared as the filling became black.

The foundation of my study on this line was laid in observing manifestations made known by wearing a silver plate from 1847 to 1849. During that study I came to know to my own satisfaction that vital currents in the animal body direct, attract and repel organized matter under the same laws that obtain in physics. The connecting link between minerals and organized food is demon-

strated in the use and relish of organized carbon, which statement is given without authority of books that I know of. Burn vegetable or animal foods, and we have charcoal. Roast coffee, or broil a steak, we have changed the carbon in the food, which is still organic matter, so that it is palatable and nutritious. I will drop the subject here, and have only referred to it as an excuse for adhering to principles which have been denied by high authority.

A letter from Wisconsin was delivered with the one asking for this paper and its title, and reads as follows:

"In Cosmos you spoke of using varnish for purpose of lining cavities. What kind of varnish do you use?" I have used most of Canadian balsam cut in chloroform, but have copal ether, which may be even better; either will answer. The latter is more disagreeable to the patient, and more difficult to keep in readiness.

"About how thick should it be?" Sometimes as thick as heavy varnish for furniture, but for ordinary use very light or thin. To have the thickness you wish to use, have two bottles. The most convenient ones are those with glass stoppers inclosing the neck of the bottle on the outside; use vaseline, and the stopper can be easily removed and be always tight. Evaporation takes place when the bottle is open, so one bottle will likely be thicker than the other. "Should it thicken too much, how do you thin it?" Add a little of the solvent. "Say also where it can be purchased." At a drug-store. The copal comes in a clear hard gum, and needs only to be cut with ether. The balsam may be obtained in like manner, but usually it is a clear balsam that will run from a bottle with difficulty. The solvent must be driven off, or it will not harden or dry. Place some of the balsam in a sauce-plate or shallow dish, cover it to prevent dust, and keep it for days upon a radiator or on the back of a stove where the heat will not be much above boiling water. Avoid heat that discolors. When the volatile portion is driven off the balsam will fly in pieces when struck with a pointed instrument; but when it will receive a dent, evaporation is not completed.

Extracts from another letter: "Have you found a cement that you dare place over a nearly exposed or inflamed pulp without some intermediate or non-irritant?" I have not used any cement free from such tendencies. With varnish applied over the pulp and sensitive dentin it will make little difference about irritation. Varnish can be applied on a disk of paper varnished on both sides without covering side walls of cavity. The paper gives more body to the varnish, and takes but little room.

"Do you wait for cement to get quite hard before inserting the amalgam?" I do not, unless the cement is to be a part of the filling. For linings the cement is best thinner than would be used for setting crowns. Where the cavity is very shallow it is better much thinner, so as to be forced out by the filling. For cement fillings, with amalgam facings, fill the cavity with cement and cut away below the enamel. As for facing fillings worn down, excavate deep enough for a facing, touch the cement with a new mix quite thin, or varnish the same, and introduce the amalgam.

I find this paper already growing too long, and will add a few practical hints suggested by questions which must otherwise go unanswered. Varnish cavities before filling with gutta-percha. It forms an inseparable union with dentin. When front teeth are to be filled with gutta-percha where the enamel is transparent, varnish and line with two thicknesses of gold foil which has been prepared by being stuck together with varnish, and also varnished on both sides. The filling may become worn and be refilled; the lining shows as beautifully as a new filling, and will not be disturbed in excavating the old filling.

In conclusion, I will offer my practice in the endeavor to prevent electric disturbance between gold and amalgam when inserted in approximal cavities, more frequently occurring between bicuspids or bicuspids and molars. In former years we used chloro-percha or gutta-percha in thin sheets or disks, that does not make a good lining nor solid foundation. The nerve excitement is caused by an electric current, and the remedy must be upon the principle of insulation. There would be a slight current between gold and tin. As we seldom have occasion to use tin in that connection, we pass tin with the knowledge that the same treatment would apply as for amalgam.

Let us take for illustration approximal cavities between first and second bicuspids extending from the coronal surface to the gum line, one being filled with gold and the other to receive amalgam. Line with cement, or varnish, if cavity is shallow, and there will be no trouble with the amalgam. Disturbance would come from the gold, if any. The gold would be charged with electricity from the amalgam, or, in other words, would stand at a higher potential than it had done formerly. The current would flow from the negative element; the gold by the best conductor, or line of least resistance, which is often through softened dentin to the pulp. Remedy: remove the gold filling, fill with gutta-percha for a few weeks, insulate, and refill with gold if desired.

Second: condition, one cavity filled with amalgam; insulate and fill with gold. No change in amalgam.

Third. Both cavities to be filled with gold, no current of course, but increased chemical action at the gingivæ; use guard fillings under both. If amalgam, it need not be more than one-eighth of the filling. Tin should be used one-fourth of the filling or more. It is a mistake to suppose that two amalgam fillings can be so nearly alike that no disturbance will follow. Observe the appearance of the gums between amalgam fillings. Although the current is light, the filling on a short circuit to the pulp serves as a conductor, the opposite filling adds another cell or battery. All approximal amalgam fillings should be insulated.

It has been disputed that a gold bridge could affect gold fillings. I have had two cases of much severity. Time forbids more than a statement of the principle. The band of a bridge on the second molar came in contact with a large gold filling on the approximal surface of a third molar. While the tooth was not apparently loose, it vibrated sufficiently to break and close the circuit. Pain

unendurable. A gutta-percha wedge gave relief. Remedy: Gutta-percha filling. Cause of current: all gold in the mouth, by reason of chemical action, becomes charged like the negative element in a battery with open circuit. The gold filling was simply a conductor; the nerve-trunk was the receiver.

We often see a bridge supported at one end by a spud filled into the crown of an approximating tooth; some with gold; some with amalgam. When practical use amalgam. A gold filling conducts a current through the enamel and leaves it to enter the dentin, should it prove a conductor. The amalgam receives the current and returns it to the bridge, as the trolley-current is returned to the dynamo. The amalgam guard filling under gold acts upon the same principle.

After this paper had been completed and a copy sent to your committee, a case which will be described came to my office for relief and counsel.

On the 25th (Christmas day), a lady patient, whom I had three years before referred to a dentist for a small bridge, called for treatment of a case which is typical of many other conditions for which standard works seem to give no remedies, except for a mistaken cause, *impingement* of gold at the gum line. I will give a minute description of the case. A small bridge had been inserted which was anchored to the second upper bicuspid by a full gold cap-crown, which extended slightly under the gum. The space between the cuspid and gold crown was filled with a narrow bicuspid porcelain-faced dummy crown; on the posterior side, the first molar never erupted, or it was lost in early life. The second molar had moved forward so that an ordinary bicuspid filled the space; that, too, was porcelain-faced and gold-capped on the coronal surface; a spud extended to the crown of the second molar and was filled in with gold. The work was well done, and is now in good order. The crown of the tooth which supports the bridge was not disturbed except as made to fit the cap; the pulp is alive and root apparently healthy. The gum from the first gave trouble, which has increased; a pocket has been formed, from which pus discharges when inflammation has been severe. The doctor thought it a case of impingement, but that is not the cause; the gum is free and overlaps but slightly. In the paper I mention a case where a bridge discharged a current into a gold filling, and the remedy was a gutta-percha filling. This bridge discharges a current between the gums and the neck of the tooth. I will recommend removal and shortening the crown so as to make a visible line of the root between the crown and gum, which will, I think, effect a cure. But while waiting the return of the dentist, I am experimenting. Treatment yesterday, pyrozone and painting with iodin. To-day, gums much better.

The writer wears two bridges and three gold-capped crowns, and in the above-mentioned bridge has been giving his personal experience with oral currents up to the last writing. He has written enough upon occult science and premature practice, and will now turn over to you the *key and combination* of oral electricity with instructions as follows:

I. In the process of mastication, by which positive and negative elements of food are ensalivated, vigorous chemical action ensues.

II. All excited chemical liquids are factors in generating galvanic currents.

III. The currents thus generated in the mouth are *organic*, and bear the same relation to *physical* currents produced by metallic fillings that food does to minerals. The organs of taste readily make known the difference between organic food, or minerals; also organic currents and the physical current.

IV. When gold or platinum is placed in this chemical mass, it converts and receives to itself pure physical electricity. Thus, every gold filling, crown, or bridge, becomes a storage battery which is discharged by the conductor of least resistance. The tongue, mucous membrane, and gums are such conductors.

V. When the metal of a bridge comes in contact with a metallic filling in an adjacent tooth, the pulp testifies, and occasionally, not always, when the gold crown passes between the gum and the neck of the tooth, the dentin and gums respond as already described and expressed by the writer.

Gentlemen, I thank you, and through you I wish to thank the dental profession for the patience and kindness shown in exchange for the radical doctrines which at *first*, and so *long*, antagonized practice. And I rejoice to have seen harmony between principles and practice, and not less that the *saving* of teeth is paramount to the way in which they *must be saved.*

The Principles of Therapeutics.

BY HENRY H. BURCHARD, M.D., D.D.S., PHILADELPHIA, PA.

Writers upon medical subjects and medical philosophers are accustomed to applying to that branch of medicine which deals with the treatment of disease, the appellation of "the science of therapeutics." The phrase as used has never in any age, even in our own, passed without criticism. There are those, particularly among physicians who have grown old in practice, who view the alleged science with a skepticism which they do not disguise. Many of them have gone to such length as to stigmatize therapeutics as a pseudo-science; not in the sense that phrenology or chiromancy is a pseudo-science, but as a course of procedures which are based upon premises the soundness of which is highly questionable.

Compared with some of the entirely exact, and even with those sciences less exact, it is certain that therapeutics does not occupy a position which we would be justified as placing among the exact sciences.

That the practice of medicine, and, of course, its allied dependencies, does not belong to the exact or even the semi-exact sciences, is evidenced by the applicability of such a title as the

"Science and Art of Medicine." There is a science, and there is an art element. It admits of no controversy that the art element is found in the province of therapeutics, which is the domain of medical empiricism. This is the wail, and well-founded wail of the medical skeptic. But the picture has another side. Although it is true that the practice of therapeutics is much colored by empiricism, it is equally true that the science aspect of therapeutics is growing day by day, that truly rational therapeutics is broadening its field. Experimental pharmacology, physiology, pathology, physiological and pathological chemistry, are mending year by year the objectionable condition to such a degree that therapeutics is on the high road to a position among the sciences, and it is hoped before many years we may confidently speak of the science of medicine without hearing the skeptical comments of the learned veterans.

The researches of the pharmacologists as to the chemical structure and composition of remedial agents throws much light upon the heretofore dark spots of the therapeutic properties of drugs. This chemical aspect of the subject is becoming of increasing importance, as the experimenter directs his observations more to molecular than to molar effects and reactions.

It is recognized and emphasized that cell life is in a great measure summed up in chemical interchanges, and that the actions of remedies are due to the chemical reactions which occur between the contents of cells and agents which are brought into contact with them. The study of the effects of drugs upon organs is secondary to a study of their effects upon cellular elements. The scientific pharmacologist is no longer content with the observation that certain drugs have observable general effects, but seeks to find the precise mode of their action upon protoplasmic elements. Following this, his observations are in circles of increasing size, until the entire range of the action of a drug, both direct and remote, is determined.

This form of investigation is as yet in its infancy, but it is a healthy infant, as any one may convince himself by a study of such works as that of Lauder Brunton "Upon the Relations between Chemical Structures and Physiological Action," and the series of articles by Halliburton in the *Lancet,* March, 1894, *et seq.*

The results of such investigations are as yet not widely applied, nor are they classified by the general practitioner. Dentistry as a hand-maiden to medicine is waiting for safe generalizations from the older science. It is a trite question, however, whether we are abreast of our medical brethren as to our classifications and the definite applications of drugs. There is much evidence to show that our drug empiricism is, if anything, more pronounced than that of the general practitioner. Our special pharmacology is made up of a large number of data, forming but a loose structure. It is not uncommon to find these single elements applied with such questionable fitness as to indicate a nebulous comprehension as to their action. Not infrequently agents which in works on materia medica and therapeutics are placed in one group, and assigned a

definite range of action, are found in a dental essay to have attributed to them properties at variance; this divergence may possibly amount to almost self-contradiction. The same criticism, however, applies with equal force to general medicine. Pharmacologists and therapists detail minutely the structure, origin, general and special action of a drug, and yet it may be that its application by a practitioner is made with scarcely any regard to the results of the researches of the scientist.

That this indefinite application may possibly furnish some usable data is true, and were even these individual elements classified it would be a gain, for at present data resulting from such observations are so loosely connected that associations are unheeded or obscured.

The majority of medicinal agents claiming our attention belong to the general group of antiseptics. It is quite possible to have this or any other group subdivided after the manner of a botanical or zoölogical classification, into minor groups. That these agents differ as to action we all know, and as a class of practitioners familiar with most of them, there is no good reason why we should not be the ones to furnish a classification.

The medical world may flatter itself that it has outgrown all the fallacies of the past, but the relics of the old superstition as to drugs having a magical power still exist in some measure, and this with a not inconsiderable number; it is the last vestige of a belief which gave origin to a faith in magic potions. It is time to rid ourselves not only of the remnants of beliefs accepted without inquiry, but of all obsolete ideas and inaccurate conceptions, and apply drugs or any therapeutic measure as we should; to subserve a clearly defined purpose, our faith in the results to be founded upon an accurate knowledge of conditions present, those we desire to produce, and of the *modus operandi* of drug action.

We have in our archives much of the means to enable us to do this, and thus make our therapeutics assume a truly scientific aspect. Much of this literature, certainly more than is fully applied, may be found in journals published in English. Such journals as the *Lancet, British Medical Journal,* and several of the American periodicals contain much material which we might sift to good purpose.

It is necessary, if dental therapeutics is to be classed with truly rational therapeutics, that our modes and chain of reasoning be made to agree with that which is accepted as sound reasoning in general practice.

For purposes of present illustration the basis of reasoning is the human denture and its environment; this, however, is too narrow a conception, for much is learned from a study of comparative dental pathology.

The enamel of teeth has a definite anatomical structure, subject to aberrations, has a questionably ascertained chemical composition, and is devoid of vitality; this is factor number one. The human food is of classes whose chemistry is quite exhaustively known; factor number two.

In the human mouth there flourish a number of minute vegetable organisms, among which are those which are capable of profoundly altering the composition of organic matter, food débris; notably organisms which are capable of transforming ptyalized starch into lactic acid, which in a nascent state is a powerful solvent of the enamel of the teeth. The conditions of life of these organisms are but imperfectly made out; our fixed data being the nature of their food supply, carbohydrates, their probably universal distribution, their multiplication in such situations as food débris can find prolonged lodgment. Moreover, the same organisms form continuous zoöglea masses which adhere tenaciously to enamel surfaces. Their growth and virulence is more pronounced in some cases than in others, the reasons for which are undetermined, but probably have a close relationship with the condition of oral health and with the general health of the individual. The aim of all rational therapeutics is to remove disease causes, and remedy the effects of their action. The object is to prevent or check the dissolution of the enamel. Indeed, were this object fully possible of attainment, dentistry would be restricted to narrow limits.

As it is impossible to increase the resistive power of the tissue acted upon, the enamel, which once formed is unalterable save through the action of external agencies, our efforts are confined to acting upon the destructive agencies themselves. Did we know fully the life conditions of the active agents in the production of lactic fermentation, these conditions might be altered; but in the absence of such knowledge, efforts are perforce confined to two objects: the removal of food supply and the destruction of the organisms. The first of these objects is but partially attainable; the human dietary will certainly remain unchanged. Soluble carbohydrates will be eaten and their débris will be found in crevices and spaces, unwashed by the saliva and unaffected by the conjoined movements of tongue, cheeks, and lips. The removal of this débris being certainly indicated, the first steps of rational therapeutics is the judicious use of toothpicks, brushes, and floss silk. The second, the removal of adherent masses of organisms upon enamel surfaces, which means the vigorous and thorough use of the dentists' cleansing agents, both tools and abrasives. The next object, the destruction of the organisms, requires the use of efficient germicides. The Pharmacopœia contains a list of germicides, many of which will most certainly and promptly bring about the destruction of all forms of micro-organisms. There are other elements, however, to be taken into consideration. Agents which have the power to destroy or lessen the vitality of micro-organisms affect also the vitality of living animal cells with which they are brought in contact, although there are agents or drugs which appear to act specifically upon certain forms of vegetable organisms without affecting injuriously animal tissues. It is the rational indication, therefore, to select the drug which, while acting destructively upon the micro-organisms, has a harmless and, if possible, beneficial effect upon the animal tissues, which are in a condition of debility, at least are the seat of altered function. This

points to the propriety of including such agents as eucalyptus in the formulæ for antiseptic mouth-washes, and the impropriety of using carbolic acid as an ingredient of such prescriptions.

A failure to successfully interpose therapeutic measures, and the dental problem increases in complexity. Factor one, the enamel, has succumbed over an area, and other elements are here. A matrix of less resistant calcic material and inclosing a network of tubules, each of which contains a protoplasmic process. These have properties and functions with which we are familiar. The combined structure is assailed by the same forces as in the preceding, with the addition of a more potent element, one capable of following the protoplasmic tracts and destroying them. There are two primary elements for consideration in this and succeeding conditions; these are the forces of attack and strength of resistance. These differ widely in individuals, and at times in the teeth of the same person. But it is undetermined what the precise relationship is between variations in the strength of attack and amount of resistance; this ignorance is promptly reflected in the application of therapeutic agents.

The problem is the checking of the growth of micro-organisms thoroughly, with as little destruction of anatomical structure as possible. As a second consideration, the prevention of their future access; third, a restoration of normal conditions, as nearly as may be.

In connection with this matter, the results of the experiments of Professor Truman, as to the relative penetrating power of coagulants, should find application.

A step farther and there is a greater alteration of conditions, and so, necessarily, the therapeutic demand becomes modified. The citadel, the pulp, is being approached and threatened.

A greater loss of substance, organic and inorganic, is placing this organ under conditions to which it is unaccustomed. Evidently rational therapeusis suggests that in addition to the means required for the restoration of partial normality in the preceding case, there be other factors necessary to accomplish the end in this. This opens the whole field for the consideration of choice of sterilizing agents, obtundents, linings, varnishes, filling and capping or destruction of the pulp. Each application should be suggested by a full comprehension of conditions present, and an accurate knowledge of the properties of corrections and the success of the operations will be largely in the ratio of this knowledge.

Next to pulpitis. Pathologists have shown us several varieties of this disease, ranging in effect from a higher organization of cellular elements, or their hypertrophy, to a chronic congestion, suppuration, and gangrene, and there are definite and determined, or better, indefinite and known, changes peculiar to each variety.

In reading descriptions of these in works on pathology, it may seem to be but a matter of dry details; but in fact they are pregnant with significance; for anatomical changes are necessarily due to alterations of physiological action, and unless we comprehend these aberrations of function, and the precise action of the therapeutic

agent we propose to apply, our efforts may be or are abortive. The subject of the aberration of physiological action in the formative cells of the dental pulp is one which deeply concerns us. For many years it has been held desirable, on theoretical grounds, that the self-protective power of the pulp was a desirable action to induce; that in deep cavities and with exposed pulps, this organ should have its recuperative power stimulated. This would be unquestionably true were we able to gauge with exactitude or to control perfectly the extent of this action; that if this activity of the pulp ceased with self-protection alone, with the uniform deposit of dentin over a circumscribed area of the pulp's periphery, well and good.

An examination of teeth which have been the subject of secondary activity will show the formations to be decidedly ungovernable, so that, instead of only recuperation, we have a most undesirable growth, which may produce a greater mischief than the one we are endeavoring to remedy. In this connection the writings of Professor Black, in the "American System of Dentistry," as to secondary deposits in pulps, are very significant.

So that, rationally, before we take steps to induce a condition we should first assure ourselves that the condition is desirable. Each possibility or probability of an induced nutritive change requires consideration, also the exact amount of change and its type, which may be induced by the medicinal agents we may apply.

The pulp dies and with it, of a necessity, all the vitality of the dentin vanishes, and we have another set of conditions.

The organic matter, in the conservation of which we were concerned in the previous cases, becomes now a menace. The structure now threatened and which calls for aid is the pericementum; an incidental object is the preservation of the color of the tooth.

A cavity containing decomposing organic matter opening into the general cavity, the stomata of innumerable tubules, and each of these containing matter susceptible to a like decomposition, and this, with the active causes of decomposition present in abundance, and the products acting to an increasing extent upon the apical pericementum. Rational therapeusis suggests the removal of decomposers and decomposable material, and rendering impossible now or in the future access of irritating products to vital parts.

In this connection dentistry furnishes a marked example of rational therapeusis in the suggestion of Dr. Kirk as to the use of sodium peroxid in this and kindred conditions. This is about as good an illustration of the application of theory to practice as can be found. It and cocain are the two ideal remedies in their respective fields. Sodium peroxid in its action combines the properties of sodium hydrate and of hydrogen peroxid; those of fat saponifying, albumen dissolving, sterilizing, and bleaching. A union of the properties of kalium-natrium, and of pyrozone, and it will be seen it possesses all the essential features for the treatment of the interiors of dead teeth.

According to the extent of protoplasmic decomposition in the tubules, which varies with the length of time decomposition has

been in progress, will be the conditions requiring consideration. In the typical condition of pulp-decomposition there are several substances present: peptones, at the apex of the root; higher are probably ptomaines, next fatty matters and aromatic products, while in the pulp-chamber are the end products of decomposition, CO_2, H_2S, NH_3, and H_2O, and in the crown cavity the pigment formed by the union of sulfur with broken-down hemoglobin. All of these are decomposable by Na_2O_2, and after the action of which the tubules which have contained much decomposed material are left empty, when dried, which space is to be occupied by a quickly evaporable solution of some colorless resin, to replace the original tubule contents.

Sterilization being complete, as it necessarily is if the sodium salt has done its office, the problem is to maintain asepsis. It has been quite clearly shown that the entrance of saprophytic fungi, via the pericementum, is highly improbable, so that the present problem is the prevention of the access of organisms to the dentin by way of the tooth crown and by way of the apical foramen. That is, the length of the pulp-cavity is to be occupied by some substance which hermetically seals, is undecomposable. Considering the form of the space, and the nature of available materials, it is evident that a plastic substance, unaffected by the serum of the blood, which hardens and remains unchanged, is the rational indication which explains without further argument why the zinc oxychlorid is the substance which the general voice of the profession calls the best canal-filling.

Considering the effect of zinc chlorid upon protoplasm,* it is evident that the oxychlorid cement is *the* substance indicated where the contents of the tubuli have not undergone decomposition,—*i.e.*, when the pulp is intentionally devitalized and extirpated.

In the next class of disease conditions, affections of the pericementum, there are several stages, grades and varieties of anatomical change and morbid physiology, each of which involves the therapeutic problem of removing causes and the correction of the abnormal conditions arising as effects, directing toward each condition agencies which have specific power to neutralize the conditions.

The acute forms of pericementitis, which range in severity in a scale say from one to ten, are each to be regarded as a complexus of pathological states which require therapeusis fitted to each. From this point the pathological states confronting the dentist pass to severe inflammations, osteomyelitis, suppurations both acute and chronic, necrosis, and such general conditions as septic intoxication, septicemia, and it may be even pyemia, to each of which remedies and agents should be applied with a distinct idea and intelligent conception of the work each is to do, and nothing used or nothing done without a definite and rational conception of why it is done.

With a comprehensive knowledge of pathology, symptomatol-

*Jas. Truman, Proc. Acad. Stom., Phila., 1896.

ogy, diagnosis and pharmacology, rational therapeutics should follow as a corollary. Therapeutics is sound just in the degree that it is founded upon a knowledge of the morphology and physiology of disease and an accurate comprehension of the properties and actions of remedial agents.

There is no item furnished by the pharmacologist, chemist, pathologist, or clinician which may not have its application to our needs; no short note of pathological histology or of physiological chemistry which may not have its bearing upon our practice; and as practice itself is summed up in therapeutics, it is our office to find these direct applications.

Union of the American and Southern Dental Associations.

BY THOMAS FILLEBROWN, M.D., D.M.D., BOSTON, MASS.

The American Dental Association was formed as a more perfect organization to succeed the American Dental Convention, which it soon supplanted.

The Southern Dental Association was organized to supply a need which can now be better met by one large, truly national body.

Both associations have done good work, and each has supplied a want existing in the professional life of this nation.

Both have been practically local societies, though ostensibly national. The Southern has been limited by its name and its practice. The American has continued too much an Eastern institution, and has hardly kept pace with the march of progress. Its methods no longer serve its best interests; and there need be no surprise at the loud call that is heard for a reorganization and the adoption of methods that shall infuse new life into its councils.

The vital question to-day is, how to form and organize a society which shall be truly national, and serve the needs of the dental profession of this country.

The most natural course seems to be a union of the American and Southern Dental Associations in one strong, national society, with a constitution which protects all interests, invites the best efforts of all its members, and provides for progress and enlargement in the future.

The profession united in one national association will respect itself more than it can while divided, will be more influential at home, and thus be able to do more to elevate professional character, and make the influence of the dental profession in America more potent in all its relations with the world.

The social element is one of the most powerful forces for the progress of humanity, and this will be greatly strengthened by union. Only a few men feel able to afford the time, to say nothing of the expense, to attend two series of meetings in one season both serving the same end, hence under the present dual organization many are deprived of the satisfaction and benefit of personal acquaintance. In one association the members from the East, South, and

West will come together at regular periods, compare experiences, offer mutual suggestions, and enlarge, deepen, and strengthen their personal relations. All those who were fortunate enough to attend the union meeting of the American and Southern Associations in Louisville in 1888 realize how pleasant it is to dwell together in unity.

By union the importance of the state societies will be enhanced; as the meetings of the larger body in each section of the country will be less frequent, the leading men of each state will naturally interest themselves in their home societies and make their proceedings more valuable, and thus be more able auxiliaries to the National Association.

In 1894, at Old Point Comfort, the American Dental Association appointed Thomas Fillebrown, J. Y. Crawford, Louis Jack, B. Holly Smith, and J. N. Crouse a committee to promote the cause of union of the two associations, and invited the Southern Dental Association to appoint a like committee for the same purpose.

In response to the invitation the Southern, at its meeting in Atlanta in 1895, chose Drs. L. G. Noel, E. P. Beadles, J. T. Calvert, F. Peabody, and J. R. Knapp a committee to consider the subject with the committee of the American. These committees have sought to obtain a consensus of opinion as to the desirability of union and the essential points of a plan which would prove acceptable to the members of the associations, which would protect the interests of the minorities, and at the same time provide the best working plan at the present time possible.

At first considerable opposition to the movement was expressed. The opposition seemed based upon the fear that rights would be denied the minority and also upon affection for the old associations. As the matter has become better understood opinion has been more and more favorable to the movement. The votes of both associations, although not decisive, have invariably been favorable to a union.

A plan including the following provisions meets with quite general acceptance.

1. It seems desirable to take a new name, one distinctly national; just what it should be has not yet appeared. The committees invite suggestions from any member interested.

2. Divide the country into divisions, South, East, and West, and meet alternately in each section. This will insure a meeting in each portion of the country every third year.

3. Organize the new association in sections the same as the American is now, but have the president (or executive committee) appoint chairmen known to be competent and interested to do the work. It is believed this would lead to more effective and better work. Often in the past but few would be present at the organization of the sections, and men neither fitted nor interested would be chosen to official positions.

A return to the old committee plan has been sometimes advocated. This plan has been followed in the Southern, and the re-

sults of the past few years have not been especially encouraging for its adoption in a new association.

The plan of sections above proposed contains the essentials of the committee plan, but it makes it obligatory upon every member to join one of them, and insures an efficient head to organize and lead the work.

5. A more intimate relation with the state societies may be promoted by providing that they become practically branches of the National Association, and also by making it the duty of societies sending delegates to make a report of the year's work of the society to the association.

6. Provide for membership of permanent delegate and honorary members as the American Association does now.

7. Choose a president at large, or from the section in which the last annual meeting was held.

Choose one vice-president from each section, the vice-presidents to be of equal rank, and not first, second, and third, as is now the case in both associations.

8. To many it seems desirable to change the date of the meeting to some time in September, so that members will come fresh from their vacations ready for work, instead of tired out at the end of an exhausting year. The change would also avoid the excessive heat of August.

While the College Faculties Association and the National Board of Dental Examiners have done a great work for the uplifting of the profession, they have thus far been a direct injury to the interests of the National Associations.

The Southern has suffered because so many of her members have necessarily neglected its meetings to attend the meetings of the Faculties and Examiners, which have been held at the same time and place as the meetings of the American. The American has suffered severely by the meetings of the Faculties and Examiners overlapping its meetings and absorbing the attention of otherwise active members.

This can be remedied in one of two ways, either by the Faculties and Examiners meeting at another time than that of the National Association, or by the meeting being held a week earlier at the same place as the National Association. The latter plan is very likely to be tried the present year, and its effects can be then properly estimated. It is quite reasonable to expect the meeting of the Faculties Association to be called as early as the Friday before the time of the meeting of the American and the Southern Associations at Old Point.

If the Association of Examiners shall also meet early, the work of these bodies will be completed, and the members be left free to engage in the work of the National Association.

This is certainly one of the most important considerations for the interests of all concerned.

Dr. W. C. Barrett, at the last meeting of the American Association, and Dr. A. H. Thompson, in an article in a late issue of the DENTAL COSMOS, and several other interested members, have ex-

pressed the conviction that division associations should be formed to meet annually as parts of the national society. It is undoubtedly a wise and desirable thing to do, and it seems now quite possible to carry out this idea by providing for it somewhat as follows:

1. The members of each division South, East, and West may form one or more branches to meet annually except the year the National Association meets in the same division.

2. Each branch shall manage its own affairs subject to the constitution and regulations of the parent society; elect its own officers, and pay its own incidental expenses.

3. Each branch to receive delegates from societies within its limits, and they shall have the same standing in the National Association as those joining direct from local societies.

4. The proceedings of the branches to be sent to the National Association for publication in the Transactions of the year.

The details of a plan to accomplish this result can be arranged so as to not interfere with the customary working of the National Association. This plan will prevent the destruction of the present societies, and thus remove the principal objection that has been raised against union. One branch would be practically the Southern Association, and the Eastern would include a large proportion of the American membership.

The West might reasonably form two branches, the Western branch and the Pacific branch. Eventually the best interests of the profession may be served by making four divisions of the country. At present we shall probably better succeed with three.

This article does not presume to be exhaustive, but only suggestive.

The discussion of the subject will show us the best way.

The committee has no plan nor desire save to formulate the wishes of the members of the two associations and invite suggestions as to the points mentioned, or any others which it seems desirable to have considered.

CORRESPONDENCE.

VIGNETTES OF THE CHICAGO CLINIC.

THE thirty-third anniversary clinic and meeting of the Chicago Dental Society was held on Monday and Tuesday, February 1 and 2, 1897, and was one of the greatest events of recent years in dental circles. It demonstrated that a clinic pure and simple can, by its own merits, be made most attractive and beneficial as to its professional features and most enjoyable on the social side as well. All honors are due to the projectors and managers of the affair, from the president of the society down to the most humble worker, who contributed of their time and labor to make the meeting successful. The energetic committees of management are to be congratulated upon the completeness of their arrangements for the

convenience and comfort of the clinicians and visitors, and well deserved the thanks and appreciation of the beneficiaries of their thoughtfulness. Their success in carrying out their projected plan was something phenomenal in the history of dental clinics. One reason for this success, and a most essential element, was the utmost harmony and co-operation which prevailed among the local powers. Two of the principal colleges contributed in a generous and unstinted manner of their accommodations, accessories, and clinic material for the requirements of the occasion. The two colleges divided the honors of the meeting, the gatherings on Monday being held at the Northwestern University Dental School, and on Tuesday at the Chicago College of Dental Surgery. The harmony and system that prevailed were apparent on every hand.

The attendance was large. One hundred to two hundred visitors responded to the invitation of the society; an equal number of local dentists were present, and fully as many more dental students of the Chicago schools. In consequence, the clinics and meetings were fully attended, and at times even crowded. It was a goodly sight to see the clinic-rooms and lecture-halls filled to their utmost with interested and attentive auditors.

A large crowd assembled for a common purpose is naturally enthusiastic, and enthusiasm is contagious. The interest was maintained from first to last, and the encouragement and compliments bestowed upon clinicians and speakers stimulated all to do their best. The crowd about each chair evinced continual interest, and moved from one clinician to another with a sharpened expectation that was never disappointed.

The first clinic on Monday morning was given in the Northwestern University Dental School, where the first series of operations were performed. It is not possible to notice all the clinics in detail, but some may be mentioned for their special features. It is questionable if any dental operation can be as well illustrated on the teeth in the mouth as upon artistic models. Thus the clinics of Dr. Guilford, illustrating his matrices and method of packing gold, were much better shown upon his large models than would have been possible in the mouth. Other models of teeth were employed to illustrate other operations with equal advantage. This method could and should be extended and applied in various operations, thereby rendering them more effective and instructive to a larger audience. The ideas involved can be made more clear and the successive steps can be more readily followed. Dr. Case's clinic of taking the cast of the face in orthodontia was especially interesting, and was conducted with his well-known skill. This clinic suggested, owing to the crowd that collected around the clinician, that such clinics should be given upon a raised platform, where the operation could be well observed by a larger number. The operator should then explain his procedure step by step, and make it a clinic indeed. The exhibits of porcelain art dental work of various kinds were especially instructive, showing the advances that have been made in this branch of later years. This is a comparatively new field, and contains great possibilities for the artistic

development of our prosthetic restorations. The interest manifested in this variety of work showed that there was an increased and growing artistic spirit in the profession. Other clinics of value were given, which were appreciated by the large number of interested observers. Some few of the clinicians failed to appear,—what dental clinic, alas! is without its delinquents?—but others opportunely volunteered to fill the breach, so that the full quota was maintained.

On the afternoon of Monday a general session of the Chicago Dental Society was held in the lecture-room of the Northwestern University Dental School, which was filled to its utmost. The event of the session was a learned paper by Dr. G. V. Black upon "Recent Improvements in Filling Teeth," with special reference to the interdental space. He restated his doctrine of "extension for protection." His paper was full of his usual ripe wisdom, which, with his happy and impressive way of imparting information and instruction, makes him the ideal teacher. The interest that was manifested throughout his long paper and the enthusiasm aroused by his charming manner, as well as valuable matter, was most marked. It brought out interesting and instructive discussions upon the "interdental space" and the "contact point." Much was said of value, and some that was worthless, if not pernicious. Some things were settled, and others again were unsettled. Of one thing our speakers should be more careful,—*i.e.*, of overstating their meaning or straining their points, for extreme statements, while they are taken with proper allowance by old practitioners, must be modified very greatly before being put into practice. But the young man learns that only by bitter experience, and that experience will make a skeptic of him regarding the truth of the statements of most men who write and speak in our meetings.

In the evening another session was held in the same place, with a large audience. An excellent paper upon "Heredity" was read by Dr. T. L. James, of Fairfield, Iowa, which led to some interesting discussions. This was followed by a paper by Dr. J. D. Patterson, of Kansas City, Mo., upon "Peculiar Pathological Perceptions," with special reference to the paying of his respects to the uric-acid hypothesis of pyorrhea. The paper elicited much commendation for its boldness and originality. It was opposed, however, by Dr. John S. Marshall, who was probably the first to propose the gouty theory, and who ably defended his original claims. The subject was fully discussed, and the evening was a notable one in the value of the matter presented.

On Tuesday morning the clinic was transferred to the building of the Chicago College of Dental Surgery. It is located in the midst of educational and charitable institutions, sixteen being grouped about the Cook County Hospital at the intersection of Wood and Harrison streets. The dental college building is simply superb in external appearance and internal arrangements. Its lecture-halls, clinic-rooms, amphitheaters, gymnasium, etc., are probably unsurpassed anywhere. If any criticism could be made,

it would be that too much luxury and convenience are provided for the dental student of our day, so that he misses the character-strengthening influence of "roughing it" in his dental education, such as his predecessors experienced. However, if they do not do good work, honor their profession, and carry forward the banner of progress, it will not be because their instructors have not placed at their disposal all the conveniences and resources that modern science can provide. The dental student has harder work to do nowadays than his predecessor had, and for that reason, and because so much is expected of him, perhaps his physical being should be well looked after, that he may stand the extreme demands put upon him by modern educational methods.

The clinics themselves presented many interesting features. Gold fillings, crown- and bridge-work, orthodontia, pyorrhea treatment, root-filling, etc., were shown in various places, each operation being distinguished for peculiar and often original features. An additional program was issued which contained some valuable things. Exhibits of various kinds added to the interest and attracted much attention. Surgery came in for its share, and Dr. T. W. Brophy during the morning performed a cleft-palate operation upon a babe with decided success.

The afternoon session of the society was held in the large lecture-room of the college, the first paper in order being one upon "Sensitive Dentin," by Dr. George F. Cheney, of St. Johnsbury, Vt. It was an excellent *résumé* of the theories upon the subject, and discussed methods of treatment. The discussion was full of interest, cataphoresis coming in for its share of attention. Dr. I. P. Wilson, of Burlington, Iowa, gave a paper upon "Three Pathological Cases," which were of interest from a surgical standpoint and brought out some lively expressions of opinion in regard to the relation of dentistry and medicine. The meetings then adjourned *sine die*.

The museum glass-eater introduced at the beginning of the afternoon session was an impromptu and curious entertainment. It was not on the program, but was thrown in as a sort of "comic relief," as the theatrical people say. It was a diverting if not edifying spectacle. The destructive effects of the severe occupation of crushing glass and stones were evidenced by the chipped teeth of the performer, although these organs were unusually strong, and the physiological effect of such a diet upon the alimentary system was apparent in the anemic condition of the body of the performer.

Cataphoresis, by the way, received a black eye. The headlong career of this aggressive, impetuous, therapeutical infant experienced a wholesome check. Firstly, the clinic demonstrating its use in extracting did not succeed, at least to the liking of the patient, a stout colored man, who protested in the vocal manner so well known to "painless dental parlors." Secondly, in the discussion on Dr. Cheney's paper it was shown that currents having a too-high voltage may have a destructive effect upon the soft tissues. It was generally agreed that the street and commercial cur-

rents were too irregular, owing to the irregular demands upon them (as Dr. Custer illustrated), to be safe for this purpose, and that the best source of electrical energy is a proper and reliable battery of known constant and unchangeable voltage. The moral is that we must make haste slowly, as this powerful and promising therapeutic giant is not the harmless thing many supposed it to be.

Orthodontia had its full share of attention. Two notable experts, Dr. E. H. Angle and Dr. C. S. Case, described their ingenious apparatus and exhibited some of the marvelous results attained, both on patients and models. Truly, orthodontia is a specialty within our specialty. It is the despair of the general practitioner to see the results produced by experts such as these, and then think of attempting to do the same in the rush of general practice. He knows he cannot do it, and must sooner or later acknowledge it. What then? Simply this, that in each community there must be experts in orthodontia who, having trained for it, will give the time and attention to it that the specialty demands, and take in charge all cases of regulating for the other practitioners. It has come to that, and there is no help for it.

Suggestive therapeutics, hypnotism, disordination, whatever you choose to call it,—call it anything or nothing, though you shudder at the word "hypnotism," as one speaker said,—had its whirl. Some able advocates of "suggestion" were present, and stated their claims for the advantages of the employment of this subtle psychic force quietly and forcibly. Indeed, hypnotism was well defended in the few words that were said for it on Tuesday afternoon.

A pretty thing was the clinic of Dr. W. W. Shryock, of Fort Wayne, Ind., who exhibited some little patients for whom he had made numbers of gold cap-crowns for the deciduous teeth. Both incisors and molars had been crowned very beautifully and serviceably, so that the little owners were made comfortable and the teeth preserved in usefulness until nature could dispense with them. He illustrated the various steps of making the crowns out of pure gold, showing how the operation could be done very simply and expeditiously without much tax upon the patience and endurance of children, which must not be overstrained in dental operations for them.

Among other things suggested by this most successful of clinics was the conviction that the old-fashioned clinic is passing away. Its timely demise is probably to be attributed to the cold neglect of those whom it was intended to benefit. It served its day and generation; perhaps in that it took the place, in a degree, of the college instruction and clinics to the old-fashioned practitioner who had not had college opportunities. To him its instruction in simple methods was probably a blessing; but along with him it is now vanishing. In those days the clinician labored through a tedious but simple operation with some benefit to his audience, who tried with more or less success to "catch on" to his ideas. He gave little instruction as to why he did things as he did, but deigned sometimes to reply to questions from a persistent seeker after light. His general manner was that of defiance to

any one to learn anything if they could from what they could see of his work. He had the air of mystery about him, and repelled rather than attracted the student and learner. He was not an instructor, and only a very few were really benefited,—and those only by persistent inquiry. But we live in a different era. It is conceded in all the walks of usefulness in life that the work of the world must hereafter be done by experts of the first order. Competition in skill, and the demand for higher and still higher grades of excellence in all the products of human brains and hands, have compelled men to divide the world's work and to concentrate individual efforts within limited fields to the end of the augmentation of human power. The cry is concentration and elevation. The day of the "all-around" man is passing away. The world requires specialists with high technical skill in every department, and the dental profession is no exception to the rule. We must respond to the call for higher and still higher technical skill.

So it results that the student of the tendency of the times in dental gatherings has noted what this meeting has fully demonstrated,—*i.e.*, that the *reign of the clinician is at hand,* and that we are evidently upon the threshold of a new era in clinical teaching. The impetus that applied science has gained through the modern methods of technical instruction is destined to revolutionize our clinical procedures. The audience of the modern clinician is composed of technical men, trained in modern methods, familiar with all simple technique as taught in the colleges, so that they have no use for elementary instruction. No mediocre work or "all-around" men will satisfy them. They are impatient with trifling and simple things, such as they do every day in practice, but they demand something higher and better,—the best that the best experts can furnish. *And this demand must be met.* We must have experts alone at our clinics, and these will be listened to and applauded. This was apparent at this great clinic meeting. The acknowledged expert clinicians were well attended, and the mediocre men were neglected, as they deserved to be. There is a lesson in this, and it must be heeded by those who would organize clinics hereafter.

What is the field of the modern clinic, then? Truly, the old-fashioned clinic came to be of little use, for the reason that its simple ways of doing elementary things are superseded by the clinical teaching that the student receives at college. The modern clinic therefore becomes a post-graduate school, and to maintain its place must keep abreast of the very latest advances and bring the very latest things to the notice of the profession and demonstrate how they are to be done. The advanced practitioner goes to a clinic to see the newest and latest things, and to see experts operate in demonstrating them. The elementary things he has learned at college, and he now desires to go forward and keep up with the advances. He attends the clinic as a post-graduate student, and expects things not only to be up to his capacity, but to learn of things that are beyond him. To meet this demand our clinics must therefore be advanced.

The banquet on Tuesday evening at the Palmer House was the

great social feature of the meeting. As they never do things by halves in Chicago, their banquet was a success in itself. Fully three hundred assembled in the ladies' ordinary, which had a historic interest in connection with the Chicago Dental Society, for other anniversary meetings and banquets had been held in the same room before. Many old friends met together again, the representation extending from Colorado to Vermont, and from Minnesota to Alabama. The gathering was national in its extent. Indeed, geography was the notable feature of the toasts, all sections and climes being duly represented in the responses. Dr. Ottofy spoke of the historic interest attaching to the day when, thirty-three years ago, a handful of Chicago dentists—a few of whom are still left—assembled in the office of Mr. S. R. Bingham and organized the first dental society of Chicago. Dr. Harlan spoke of it being the anniversary of his arrival in Chicago, and also of his later connection with the society. A cloud of sadness hovered over the occasion on account of the death of Dr. Swasey, an ex-president of the society, as well as of that of Dr. W. N. Morrison, Dr. S. E. Brown, and others. After the welcoming toast by Dr. Harlan, Dr. Guilford, of Philadelphia, responded in behalf of "The Effete East." The "Eloquent Crawford," of Nashville, Tenn., responded for "The Sunny South;" Dr. T. E. Weeks, of Minneapolis, for "The Frozen North;" Dr. W. E. Griswold, of Denver, for "The Wild and Woolly West;" Dr. J. D. Patterson, of Kansas City, Mo., for "The Great Valley," so that the geographical features were especially prominent.

Dr. W. H. Richards, of Knoxville, Tenn., responded to "Unity" in science as well as in politics, and the abolition of sectionalism.

Dr. H. A. Smith took the place of Dr. H. J. McKellops upon the program, responding to "One of the Boys." Dr. Smith had also been a resident of Chicago in ancient days. Dr. J. E. Cravens, of Indianapolis, responded in behalf of "The Clinician," who was so much in evidence at this meeting. Dr. B. Holly Smith, of Baltimore, responded to "The Cradle of Dentistry," in relation to the first college and dental society ever organized.

Thus ended this great meeting, which will pass into history as one of the most important gatherings of recent years. It set a pace for clinical exhibitions and instructions which marks a distinct advance over anything that has gone before, and that will make the managers of clinics hereafter "hustle," to use a western Chicago phrase, to keep abreast of the high standard here set.

SCRIBBLER.

LETTER FROM DR. KELLS.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I desire to suggest to the dental profession that as the work already done by Dr. Black in his recent investigations of the working qualities of amalgam is of vital interest to us, we should do our utmost to induce him to continue in the field he has merely opened up.

To most of us it is an object of almost humiliation, to find at the end of a comparatively short time some of our most careful work in the way of amalgam fillings fails, while other work done in the same manner—that is, as far as possible—proves so satisfactory and lasting.

So far, Dr. Black has experimented in a certain line only, manipulating the material in a certain manner.

What remains to be done in the matter is to test the material as it is used in practice, which conditions would naturally suggest themselves to him, although it might be advisable to get the views of prominent operators upon these points.

While he has spent an enormous amount of time in his preliminary studies, what remains to be done will require vastly more, and he nor no one else can be asked to undertake, unassisted, such a work for the good of the profession at large.

Now, what I propose is this: let the COSMOS, the leading magazine in the dental world, do what occasionally one of our great dailies undertakes (and what really helps materially to make them great),—that is, take up some object that a journal alone can undertake, and carry it through to success: *vide* the building of the foundation of the Bartholdi Statue in New York Harbor.

Let, I say, the COSMOS, through its editor, select from its subscription list two hundred and fifty names of the men most interested in the welfare and progress of dentistry, and ask them to join me in a subscription of say one hundred dollars each; this would net the sum of twenty-five thousand dollars, to be placed at the disposal of Dr. Black for the continued study of the subject and accomplishing the result of placing upon the market an amalgam that will be absolutely reliable, in the hands of careful operators, when the directions for its use are followed.

How readily would many of us pay even ten dollars an ounce for an amalgam which we could insert *satisfactorily* in small approximal cavities between the molars and bicuspids!

I believe if the plan I have outlined could be carried out, and Dr. Black be persuaded to carry on the good work to a successful termination, an incalculable amount of good would result, and the contributors receive tenfold value for their small contributions.

C. EDMUND KELLS, JR.

March 4, 1897.

PROCEEDINGS OF SOCIETIES.

OHIO STATE DENTAL SOCIETY.

(Concluded from page 157.)

SECOND DAY—*Morning Session.*

THE society was called to order at 10 A.M., President Barnes in the chair.

After disposing of the routine business incident to the conduct of the society, Dr. H. G. HUSTED, of Oberlin, Ohio, read a paper entitled, "The Galvanic Cell." Following is an abstract:

Galvanism is that form of electricity that is generated by chemical action. The most familiar form of the galvanic cell consists of a vessel containing dilute sulfuric acid or a solution of sal ammoniac, in which a plate of zinc and a plate of carbon are immersed, the carbon surface being much greater than that of the zinc. If the zinc is pure, there is no action as long as there is no external connection between the two; but if they are connected together by a wire, the acid attacks the zinc and electricity is generated, which passes through the fluid to the carbon within the cell, and from the carbon to the zinc over the wire outside the cell. There are many substances which may be used beside zinc and carbon. Whatever combination is used, one of them must be more readily acted upon by the acid than the other. The plates are also called positive and negative, the carbon being the positive, from the fact that the electric current outside the cell has manifested itself at that point and passes to the zinc. There are conditions when this may appear to be untrue: our battery fluid is all right, the zinc and carbon properly connected, and yet there is no current; the battery has become polarized.

When the battery is in action there is a decomposition of the water into its elements, oxygen and hydrogen. These gases show polarity the same as metals, oxygen being negative and hydrogen positive. Oxygen is attracted to electric positive zinc, hydrogen collects upon the electro-negative carbon; there being no action between them, the hydrogen bubbles remain upon and cover the surface of the carbon. The battery fluid attacks hydrogen more readily than the zinc, and the latter becomes the collecting plate, thus reversing the current.

This goes on as long as there are hydrogen bubbles upon the carbon; these may be removed by simply opening the current or raising the carbon out of the fluid for an instant. Impurities in the zinc cause local action upon the zinc, which may be avoided by coating zinc with mercury. The amount of current which can pass through is proportional to the area of a cross-section of the conductor; by reducing the size of a conductor the amount of current is reduced by the resistance which such a conductor offers to its passage. The electro-motive force is not determined by the size of the cell; it is increased by increasing the number of cells. The quantity of the current depends upon the size of the generating plate. The resistance of the human body is very great, and a corresponding electro-motive force of current is needed to overcome that resistance. For cataphoresis the number of cells needed varies greatly, from six to ten cells being sufficient in the majority of cases when under proper control. The dry cell in common use has the same zinc and carbon elements, but the exciting agent is prepared in the form of paste and the cell is sealed. This makes a very convenient form for cataphoric use, as the battery can be kept within a very small compass.

The cells are intended for use only where there is considerable resistance, or where the time they are kept in use is short. They are soon exhausted under a closed circuit.

The author's first experience with the use of electricity in the

treatment of sensitive dentin grew out of some experiments which he made in 1894, with a battery having an electric motive force of about three volts. The battery was an experimental one of his own construction; it was used successfully at the time named in the treatment of a case of hypersensitive dentin in a cavity upon the labial surface of the upper left lateral incisor, for a lady patient. Having failed in the use of several obtundents, an application of the electric current from the battery alluded to was made by placing a cathode electrode made by connecting the negative terminal to a piece of tin which was applied to the side of the face. The positive electrode was adjusted to a cervical clamp upon the tooth. No sensation was experienced from the current, but the excavation of the cavity under these circumstances was performed without a particle of pain to the patient. Later the writer's experiments were continued with the McIntosh milliamperemeter and battery in connection with cocain. The author has used the galvanic battery in cases of soreness of the face or threatened suppuration with good results, the negative pole being applied to the sore portion and the positive held in the hand, using as strong a current as possible without causing pain for fifteen or twenty minutes, repeated two or three times. In using the electrotonic method the current used must not be so great as to cause pain of itself; the engine bur must be fine-cut and sharp, the pressure must be light, and the engine run rapidly. The full strength of one and sometimes two cells may be used without the patient feeling any unpleasant sensation. The amount of current required will vary in different teeth of the same individual. In case the cavity is shallow, the caries not having advanced very far, a greater amount will usually be required than where the tooth-structure is badly broken down.

In cases where the cavities are located on the labial surface of the incisors, using a cervical clamp, place the negative electrode on the side of the face as in anaphoresis* and attach the positive electrode to the clamp as previously described. This will allow the use of other instruments beside the engine. Or the positive electrode may be attached to some point on the engine, so that there will be a metallic circuit to the bur. Special pains must be taken to avoid making a circuit through the operator. The safer way is to have the hand-piece insulated with thin rubber tubing.

Until the electrotonic method has become more fully developed, a large per cent. of cases may prove partial or total failures; but if one has an appliance which can be adapted to either method, it is but the work of a moment to shift the positive electrode from the engine to the tooth and use the electro-cocain process.

When we learn how to control the direct current so that it can be successfully used in the major part of our operations, we shall have made a great advance over anaphoresis.

After Dr. Husted's paper was read, it was decided to listen to

*The author prefers the term anaphoresis to cataphoresis, for the reason that the effect is produced at the anode and not at the cathodal terminal.

other papers on allied subjects before discussion should be entered on.

Dr. W. H. Hersh, of Piqua, Ohio, then read a paper, entitled "Some Reasons why we Fail with Cataphoresis," of which an abstract follows:

The first and principal reason which the author gave as a cause of failure in the use of his method is that the average dentist is not properly prepared for this class of work. A physician who is skilled in the use of electricity as a remedial agent gives this advice to those who contemplate the use of electricity in their practice: "First make yourself a skilled physician, then study the physics, physiology, mechanics, and chemistry of electricity; seek practical instruction in the technique of applying the same, then buy your outfit."

The reverse of this is generally true of the dentist. Does he not first buy his outfit, then seek instruction in the technique of applying it from a circular of a few pages? If success attends his efforts he will probably look deeper into the subject; but if not successful he abandons the apparatus and method and calls them worthless, when he himself is the worthless part of the outfit. The next reason why we fail is our selection of the source of the current supply. It seems almost as necessary that we have a smooth and even current as that we have a skilled operator to apply it. No one factor has played such an important part in the failures among the better class of operators as an irregular and unreliable current, excepting only, as a matter of course, inferior apparatus. The 110-volt commercial current should never be used in cataphoric procedures; first, because it is a dangerous current to use in this extremely sensitive and delicate work,—dangerous because of a possible ground through the fountain spittoon; dangerous because of atmospheric electricity or lightning coming in contact with your mains; dangerous because of wires carrying powerful currents coming in contact with the system; dangerous because of the possibilities of having the lamp burn out or break or a connection coming loose, and many other things which might cause it to prove disastrous, makes it a current that we should not accept the risks of using in this work about the head, especially when a satisfactory current can be so cheaply obtained from a few dry cells, and one that will answer every purpose and will require no care on the part of the operator.

Second, because in the majority of cities the current fluctuates and is too irregular to be used in this work. The sudden raising or lowering of the voltage, which is unavoidable in most plants, will cause pain and failure.

Third, because, when we have put resistance enough in the path of the current to reduce it so we can use it, we have a current of high electro-motive force, but with very little volume, while with the cell we have just the opposite condition of affairs. To verify this, two tests were made that clearly brought this fact out, viz: three mesco dry cells in series gave 4 3-10 volts. The 110-volt current was then shunted until there was a maximum voltage of 8

volts, which was reduced to 4 3-10 volts by a graphite resistance; on short circuit the 110-volt current gave as its maximum strength 8-10 of a milliampere, while the three cells gave $5\frac{1}{2}$ amperes, or 5.500 milliamperes, the 110-volt less than 1 milliampere, and the cells 5.500 milliamperes. Second test, 6 mesco cells in series, gave 8 1-3 volts and $5\frac{1}{2}$ amperes, or 5.500 milliamperes, while the 110-volt shunted to 16 volts and reduced by the graphite rheostat gave 6 8-10 milliamperes.

We would not have you understand by this that a certain voltage generated by cells has more power to overcome resistance than the same number of volts derived from any other source, even though the amperage or volume be made larger, but this fact I would have you note, that resistance reduces the amperage or volume much faster than it does the voltage or electro-motive force; and further, that men in the medical profession who are intimately acquainted with the physical laws of electricity, as well as those having years of experience in the use of electricity in the treatment of disease, have found that the least number of cells that would furnish the desired amount of current without the intervention of a rheostat or external resistance of any kind, will produce the same results in the same time and with less pain than can be done with a larger number of cells and the voltage reduced by means of the rheostat. That being true in medicine, it must be true in dentistry.

Fourth, because when the current is smooth and the voltage steady and even, we have a current which is not any superior to the cell, but to me very much inferior, because of the attending dangers and the extra caution necessary in handling it. The cell is such an inexpensive thing that this can scarcely be urged as against it; and there is such a small quantity used from it, it will no doubt do service for many months, and will be found to be just as efficient in the office of the country practitioner as in the splendidly-equipped parlors of our city brothers.

Another reason that may cause failure is because of too small negative surface. This fact must be remembered, that the larger the negative electrode the less the resistance, as the tooth operated upon and the skin form the major part of the resistance; and if too small an electrode is used, it causes a burning or prickling sensation, and I have noticed in many cases a deep reddening of the skin, even though a very small amount of current was used.

It also requires more current or voltage to get the same results, and therefore is more painful, which causes the patient to lose confidence, and you stop short of success, while a liberal negative surface would materially lessen the resistance, and therefore require less electro-motive force and less pain to get the same results. A single experiment will serve to illustrate this. Three cells, using a negative electrode one and a half inches in diameter and well moistened, gave three-tenths of a milliampere, while a large negative sponge electrode gave, with the same number of cells and through the same resistance, seven-tenths of a milliampere, which was more than double that of the first.

Another reason why our operations are not more uniformly successful is because of the lack of proper measuring instruments. It seems as if uniform results could hardly be expected in the administration of the current, unless we know just the amount of current that is actually passing through the tooth or soft tissues of the patient. It is my firm conviction that no one ought to administer the current to a patient without knowing precisely the amount being used. True it is that we can get along without, but it is the best way to do, and should we be hindered in any way by not having everything needed to give the best results?

Another thing that is the cause of much pain, annoyance, and failure is the mistake many operators make by trying to hold the positive electrode in the tooth. This should be avoided whenever possible, as the least movement of the point in the tooth causes pain, which sometimes makes the patient nervous and fretful, and you and the patient are both willing to quit before any deep obtunding effects are secured. A very convenient way to hold the electrode is to solder a piece of fine platinum wire onto the tip of the conducting cord, and fusing a little ball on the point with the electric current, so that when placed in the cavity and cotton packed around it, it will be retained in position, and thus save the operator the trouble and fatigue of holding it. The wire can be insulated by a small piece of fine regulating tubing. The time required in some cases which most need this method is a barrier to success that cannot be lost sight of. The preparation of the cavity before commencing is a very important item, and the thorough insulation of the tooth and fillings is certainly one of the very necessary things to do; if close attention is not given to this it will cause failure, where otherwise success would result. Many other things might cause failure, such as loose connection, inferior cords, corroded surfaces, stale solutions, inferior apparatus, and many small things in detail, which only experience can teach.

First, study some of the elementary principles of galvanism; buy your outfit of a person or company who has thoroughly tested it and proved it to be reliable, then for your first cases select some of the patients that you would dearly love to see leave you, and commence to use the cataphoric method, reserving the patients you care to keep until sufficient experience and confidence is gained to make it a practical obtundent. Use a good apparatus, large negative electrodes, fresh solutions, and some judgment mixed in with the rest, and you will find in a little time that you have an obtundent which will make possible thorough operations, where before it was necessary to make temporary fillings. Your patients will thank you for your skill in handling this agent, and all the while you will be gaining experience and mastery over a process which promises a wider range of usefulness than any method brought to the notice of our profession during the last decade.

The next paper read was by Dr. L. L. Barber, of Toledo, Ohio, entitled "A Summary of My Experience with Cataphoresis." The paper was essentially the author's deductions from a record he had kept of something less than one hundred and fifty cases in which

he had used the cataphoric method under many varying conditions both as to the kind of apparatus used and the character of the case operated upon.

In these records note was made of the age of patient, class of teeth, size of cavities, where located, suceptibility of patient to electricity; also of the dread of pain manifested by patient, and the amount of time consumed in cataphoric treatment as compared with the approximated time which would have been consumed without it. The object of the author was to determine as far as possible: first, what cases are most favorable to its use; second, what kind of medicaments were most efficient in its use; third, what conditions were especially unfavorable to its use. The author found that while many of the apparatuses intended for cataphoresis will transfer the medicaments to deep-seated tissues, there is a difference in the amount of pain produced from others, even with the same amount of current at the same pressure.

Some are so sensitive to electricity that it is almost impossible to use sufficient current to carry the anesthetic into the dentin without producing more pain than the patient cares to endure. Certain cases which at first appear to belong to that just described may, when better understood, be attributed to various other causes; for example, the case of those who are frightened by the sensation of the passage of current through a tooth when they come to understand the difference between the cold and slight prickling sensation attending the application of an electrical current, and pain, after the element of fear has thus been eliminated; the actual sensitiveness will probably be found no greater than normal.

The danger of accident from using the 110-volt current is considerable, and may occur from a grounding of the circuit when the patient on leaving the chair has taken hold of the iron bracket-arm, or some metal part of the chair. Similar excessive shocks may occur from the use of the dry-cell battery, from imperfections in some one or more of its cells, and it is better to have each cell tried separately before connecting up, and thus be on the safe side.

It was found that very hard teeth responded less promptly to treatment, requiring a higher voltage to produce satisfactory results on account of their offering greater resistance to the passage of the current. The danger to be apprehended is that the voltage may be increased to a point sufficient to produce pain by the evolution of heat in the dentin-structure; the cavity (not the whole tooth) should therefore be kept wet, and the operator should not try to get satisfactory results as quickly in teeth of this character as in soft teeth. The most satisfactory cases were found to be large labial cavities, which usually are extremely painful. These responded promptly to the cataphoric treatment. The general results in the classes of cavities which were accessible, and where the condition of the pulp was normal, was quite satisfactory. The cocain solutions which were tried varied from four per cent. up to thirty, fifty, and even seventy-five per cent. Guaiacol, though not escharotic, has a coagulating action, and therefore does not permit of all the anesthetic properties of cocain being brought out.

The author had not secured the phenomenal results from cocain that have been claimed by some investigators. Eucain was tried in quite a number of cases, but did not produce any better results than cocain, with the exception that the anesthesia was more prolonged. Of all solutions tried, the best results were obtained from thirty per cent. alcoholic solution of cocain. In his studies of cases he also finds substantiation of the therapeutic axiom that "the degree of reaction is proportionate to the degree of vitality," therefore, any condtiion of the pulp that lowers its physiological tone retards the absorption of cocain and renders the dentinal fibrillæ more difficult to anesthetize. The dentin is anesthetized primarily over the area covered by the positive pole, the current passing in the track of least resistance toward the apex of the root through the tubuli and pulp-canal. The larger the surface covered by the positive pole, the greater will be the surface obtunded. By using a disk of metal over the saturated cotton, and then placing a platinum point upon the disk, a larger surface is covered and better results obtained.

Two cases were cited in illustration of the value of cataphoresis. One a boy aged twelve years, distal cavity in right upper central incisor, and a mesial approximal cavity in the upper right lateral incisor. Both were extremely sensitive. By fitting a piece of platinum wire extending into each cavity and with ten minutes' application of current reaching twenty volts, both cavities were prepared with perfect comfort to the patient, not the least pain occurring during the process.

The other case was a man aged forty years, suffering from nervous prostration. Most of the teeth had been lost because of their extreme sensitiveness, and the inability of the patient to withstand the nervous shock of filling. The lower right second molar had a distal approximal cavity extending very much under the gum. These cavities were so sensitive that it was impossible to prepare them, nor could the cavities of decay be utilized for the cataphoric application of cocain. A small cavity was therefore drilled in the occluding surface, in which cocain was applied cataphorically for twenty-one minutes. At the expiration of that time both cavities were prepared painlessly. The patient expressed himself as entirely satisfied by the painlessness both of the application and excavation.

Dr. W. A. Price's paper, "The Relative Efficiency of Various Current Controllers for Cataphoresis," was published in full in the Dental Cosmos for February, page 90.

At the conclusion of Dr. Price's paper the discussion was postponed till afternoon, and the society adjourned.

Afternoon Session.

The society was called to order at 2 P.M., and after disposing of the routine business the discussion of the papers read in the morning was taken up.

Dr. L. E. Custer said Dr. Hersh was right when he stated that

dentists were not electricians, but the time is at hand when we must give some attention to electricity or we will not only be imposed upon by the apparatus which will be put on the market, but be unable to take proper care of the apparatus we use. There is no process in dentistry which requires such breadth of knowledge as does cataphoresis. To use this method we must know electricity and how to apply it, and know why we fail. Dr. Hersh objected to the 110-volt current. In his practice he uses it and the current from a battery indifferently, and sees no reason to object to it, except some things which have occurred which he now knows how to avoid. For instance, in one case he was using the 110-volt current. At the first contact, with almost no current on, the patient was strongly shocked. At first he could not understand the reason, but upon examination he discovered that the patient had hold of the metal part of the chair, and that there was a ground connection, through the attached spittoon. If a perfect ground connection had been formed, there would have been a terrible shock, probably from fifty to sixty volts. Dr. Molyneaux had called his attention to a danger with the Edison current. This is a three-wire system, one of the wires being neutral. If the two active wires are used, you will get double voltage. The shunt connection is not so dangerous as the series, when using the Edison current. The storage battery is perhaps the best possible source of supply, as it is so even from the time it is connected until it is run out. It is the ideal source of supply for cataphoric purposes.

The position of the electrodes is also important, and their size. The smaller they are the more liable are you to make a blister on the cheek, though this last should never happen, as it shows that much more current has been used than is necessary. In learning how to apply the current, we should select the easiest cavities at first,—a crown cavity in a lower bicuspid, for instance. Here you can see all the surroundings, and you will gradually learn to apply it in more difficult cases. Dr. Barber said some patients are more sensitive to the electric current than are others. This is true in regard to all kinds of currents. In speaking of the agents he uses in his practice, he said he used a saturated solution of cocain; the quantity which gets into the system is so little that it cannot possibly do any damage. He had not tried alcoholic solution, but it appears that it might have some advantages. Dr. Barber was right in saying that the contents of the tubuli are the conductors of the current. Dr. Price's paper was quite technical, and beyond our thorough comprehension at this time. It is one that we will all look for in print, and we should keep it for frequent reference and study. In the paper objection is made to the water rheostat. This objection is well founded; all this class of rheostats are defective. The advantage of a shunt current in connection with the battery is considerable over the plan of using only one or two cells at a time.

Dr. J. R. Bell had found in his practice with cataphoresis there were one or two preparatory steps needed to make it successful. The first is to educate the patients and get their imagination

quieted. Next, much depends upon the condition of the tooth or teeth to be operated on. When a tooth presents itself with inflamed dentin, he had to treat it with medicaments before he could successfully use cataphoresis, and he prefers to fill such teeth temporarily until irritability is gone.

The use of saturated solutions gave him the best results. When two cavities in the same tooth are to be prepared, he simply fills one of the cavities with cotton soaked with the saturated solution of cocain and applies the current, and regardless of the variation of resistance between different people and in the same people under different conditions. In his practice he makes it a rule to excavate as much as possible before he applies the current, and is astonished to find how many cases he can finish entirely without the cataphoresis.

Dr. Henry Barnes said one of the papers spoke of the advantages of having a large negative electrode rather than a small one. His first experience was with a large sponge on the wrist; now he uses an electrode smaller than a dollar, and gets better results. In his experience, the best way to secure the electrode to the cavity was to hold it in with a steady hand. He had used alcoholic solutions, but noticed that the anesthesia was of less duration than with the aqueous solution. He finds that the oral fluids make a good solution; has tried citrate of cocain with good results, sometimes producing anesthesia in much less time than he could with aqueous or alcoholic solutions of cocain.

Dr. J. W. Clark described a case of approximal cavities in both central incisors which were very sensitive. He applied cocain cataphorically to one of the teeth, and after ten or eleven minutes was able to excavate both cavities, though but one had been treated. Afterward he did the same with two bicuspids for another patient. He finds with many patients a little pain is caused by the first contact of the current, so he turns all current off for a minute, then adds it slowly, and gets perfect anesthesia. Only in cases of inflamed pulps has he ever failed.

Dr. C. S. Neiswanger, of Chicago, said he had been interested in listening to the papers read and the discussion on this subject of cataphoresis. There are peculiar theories in regard to this subject, some of which are not based on facts. There is a great field opened up for the study and use of electricity in dental practice. Much of the current literature of the subject is misleading. Cataphoresis is electrolytic, and the substance of the medicament acted upon is decomposed, and the products of the decomposition must go to one pole or the other, as it may be. Cocain hydrochlorid is a salt which has hydrochloric acid for the acid and cocain for the base. If you wish to transmit the base into the tissues, you must use the positive pole at the point of the solution. If you want to transmit the acid, use the negative pole, as all the bases are electro-positive, are repelled by the positive pole and have an affinity for the negative.

The negative electrode cannot be too large, and it should be removed as far as possible from the seat of operation. In one of

the papers the author states that he got good results using fifty per cent. solution of cocain, forty per cent., thirty per cent., twenty per cent., ten per cent., or two per cent. This statement proves that the cocain is not a factor at all. Try with a little cotton moistened with pure water, and you will find you will produce just as much anesthesia as you would with a solution of cocain of any strength.

He advocated having the negative pole as far removed as possible from the positive, because the polar effect of the current upon the nerve would be greater. Being asked whether adipose tissue would make any difference in the resistance, he thought that probably it would.

Dr. J. S. CASSIDY agreed with Dr. Neiswanger in believing that the effect called cataphoric is really due to electrolysis. We used iodin with electricity years ago, but did not call it cataphoresis. When the cataphoresis for anesthesia was introduced, some used an aqueous solution of iodin for its resolvent effect, and found that the iodin was driven into the tissue.

Dr. NEISWANGER said this was due to secondary reaction. After the iodin stays for a certain time on the positive pole it becomes of the same potential, and will be driven a slight distance into the tissue.

Dr. W. A. PRICE said that in working with cataphoresis we have two evils to avoid: the first in the infliction of pain on the patient; the other in endangering the pulp of the tooth. If the current is too slight, we have the pain; if too great, we will affect the pulp. Of the resistance, the greater portion is found in the tooth,—at least nine-tenths of it, and one-tenth perhaps between the tooth and the negative electrode. To avoid pain as much as possible, the resistance should be lessened by placing the negative electrode as near as possible to the tooth.

Dr. STEPHAN had been very successful in using citrate of cocain with cataphoresis. He not only completely anesthetized the tooth he applied it to, within five minutes, but the next tooth also. His method was to press the citrate of cocain on a piece of cotton into the tooth and put a moistened pellet of cotton over it, and apply the current to this. May it not be true that citrate of cocain is separated into its elements by the current more readily than the hydrochlorid? He had successfully extracted living pulps by the use of citrate of cocain.

The session adjourned at this point; the discussion to be continued the next morning.

THIRD DAY—*Morning Session.*

The society was called to order at nine o'clock, and the further discussion of cataphoresis was taken up.

Dr. HERSH thought it unwise to use the 110-volt current in cataphoresis, because of the possibility of shock from grounding the current by the patient touching the spittoon. The consequence of such an accident is a shock so violent as to be liable to send the patient from the office.

The current supply should be one which will give a perfectly uniform and safe current under any possible condition. Dr. Custer is not so sure of the 110-volt current as he was a few months ago, and Dr. Gillett, in his last paper, takes the ground that it had better be avoided. In his own practice with cataphoresis Dr. Hersh had never used current enough to blister the face under the negative electrode, but had caused a deep reddening of the skin. The use of a large electrode will enable you to escape this annoyance.

Dr. J. TAFT said there was a very great variety in the susceptibility or resistance of different patients to the electric current. This should be studied carefully. Another important question is the influence of this current upon the pulps of the teeth. Is it not possible that by and by dead pulps may be found as a consequence of this application of electricity to the teeth? And again, if cocain is decomposed by the electrical current, what may be the consequence of this decomposition? Again, how deep is the penetration of the cocain into the tissues? The current is said to carry it into the canaliculi of the teeth, for these are already occupied and have no room to receive the drug. Does the cataphoresis destroy the life of the dentin? Is it a mere obtunding of the dentin, or does it kill it? If it is a mere obtunding and the filling is placed in it, will it not be likely to set up an irritation when the effect of the obtundent has passed off? These questions appear to Dr. Taft of basal importance, and should be discussed and decided, rather than so many questions about batteries, currents, etc.

Dr. L. L. BAKER, in reply to Dr. Taft, said that his experience proved that cataphoresis did not kill the dentin. In a number of extremely sensitive teeth he had obtunded them thoroughly and afterward removed the fillings, and in every case found the normal sensitiveness. Dr. Bell said yesterday that a tooth in which escharotics and coagulants had been used would not be affected by the current. This is a mistake, for he had bleached teeth thoroughly which had been treated with arsenious acid.

Dr. PRICE, closing the discussion, said,—

There is a condition involved in the problem of shunts, of which I had not time to speak in my paper, and which is of considerable importance in the particular condition with which we have to deal. It is the relation of the total resistance of the circuit to the relation of the shunts themselves.

You remember we deducted as follows: Suppose a shunt around the patient. Let p represent the resistance of the patient, and s the resistance of the shunt, and S and P the currents in amperes respectively. Then if V be the potential difference in volts at the terminals of the shunt and patient, it follows from Ohm's law that S equals $\frac{V}{S}$, and $P=\frac{V}{p}$, and $\frac{P}{S}=\frac{s}{p}$; or the current strengths in the patient and shunt are inversely as their resistance.

Also, by a well-known rule in proportion, it follows that $\frac{P}{S+P}$ equals $\frac{s}{s+p}$ and $\frac{S}{S+P}=\frac{p}{s+p}$; but S+P is the sum of the

currents flowing through the shunt and patient respectively, and therefore is equal to the whole current in the circuit, let us say A amperes, hence $\frac{P}{A} = \frac{s}{s+p}$ and $\frac{S}{A} = \frac{p}{s+p}$.

What is the multiplying power of a shunt? Since $A = \frac{s+p}{s} \times P$, the fraction $\frac{s+p}{s}$ is frequently called "the multiplying power of a shunt,"—that is, the quantity that the current flowing through the patient must be multiplied by to obtain the total current.

As an example of the last equation, let us suppose that we desire that P shall be $\frac{1}{10}$ of A, then $\frac{s}{s+p}$ equals $\frac{1}{10}$, or s equals $\frac{1}{9}$ of p.

It would, of course, be possible to substitute for the two resistances, the patient and the shunt (s and p), which are in parallel, a single wire of x resistance, such that *for the same potential difference* v, *at its terminals,* the current flowing through it should be equal to the sum of the currents flowing through the two parallel circuits. To find x we have the current that would flow through it equal to $\frac{v}{x}$, then the current flowing through s equals $\frac{v}{s}$, the current flowing through p equals $\frac{v}{p}$. Therefore, since $\frac{v}{x}$ equals $\frac{v}{s}$ plus $\frac{v}{p}$, x equals $\frac{sp}{s+p}$, or if two wires be in parallel, then the product of their resistance divided by their sum represents the resistance of a single wire through which a current will pass, equal to the sum of the currents passing through the two wires, for the same potential difference. Such a single resistance is called *"the combined resistance"* or *"the parallel resistance"* of the two.

From what has preceded, we see that when P is $\frac{1}{10}$ of A, $\frac{sp}{s+p}$ equals $\frac{1}{10}$ P, or the combined resistance of the shunt and patient is $\frac{1}{10}$ of the resistance of the patient.

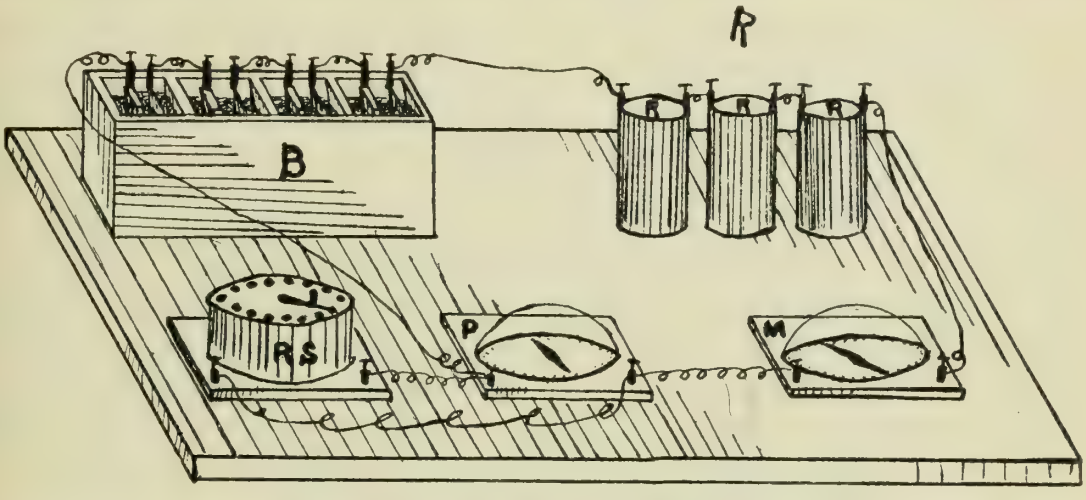
In the same way, if there be any number of shunts, a, b, c, d, etc., in parallel, and x be a single resistance, that *with the same potential difference* at its terminals the current that will flow through x is equal to the sum of the currents that flowed through all the resistances a, b, c, d, etc., the *combined resistance* x equals $\frac{1}{1 \mid a, + 1 \mid b, + 1 \mid c, + 1 \mid d}$, etc.

The insertion of a shunt diminishes the resistance of a circuit from p to $\frac{sp}{s+p}$. In some cases this produces practically no effect on the current, so that the current flowing through the patient will be $\frac{s}{s+p}$ of the current that *was* flowing through it *before the insertion of the shunt.* But in other cases this variation of the resistance in the circuit materially affects the total current, so that although P is always $\frac{s}{s+p}$ of the total current, this total current may be so increased by the diminution of the total resistance that the fraction $\frac{s}{s+p}$ of the new total current is practically

as large as the previous total current, or in other words, shunting the patient may produce practically no diminution in the current passing through the patient. I mention this because the conditions we are associated with are such that this item is of great importance.

It is easily demonstrated (see Ayerton) in this way. B is a battery of six cells in series arranged with a cell selecter. M is a galvanometer of very low resistance. R_1, R_2, R_3, R_4, resistance coils in the main circuit. P is a galvanometer of, say, 500 ohms resistance, also in the main circuit, but fitted with a shunt s. Any one of the coils, or all, can be cut out with a switch.

The resistance in the shunt s can be varied by moving its lever. Then it is found that if the resistance in the main circuit is fairly large, say 1000 ohms, altering the resistance of s alters the deflection of P, but does not sensibly alter that of M; while on the other hand, if the resistance in the main circuit is small,—that is, if the four resistances R are cut out,—then the value of s may be altered



within wide limits without altering the value of the deflection of P. But the deflection of M will be large when the resistance in s is small, and small when the resistance in s is large.

The mathematical working out of this condition is quite simple, but I will not take the time to give the equation here. If any of you contemplate experimenting with shunts for use in cataphoresis, you will find this the foundation principle on which to build your apparatus. For in the patient, which would be represented by P in the last diagram, we have a very high resistance, and a widely varying one. Consequently, we have the condition of S for the shunt in the exaggerated condition of all of R cut out.

This has brought out the ingenious devices for varying the quantity of R, and transferring part of it into the circuits of S or P in various relations. In this illustration think of P as the patient.

Now, this would not raise a new problem in ordinary electric controllers, but in the very peculiar and complicated conditions with which we contend in the patient, it does. Since we are increasing, to a certain extent, the total resistance of the circuit in which the patient is, thereby causing increased pain by any variation of potential, since the potential is higher, which was clearly demonstrated with the frog's leg. I believe that no question of

electric therapeutics has ever arisen involving so many complications of electric physics and physiology, and it will be equally impossible for the electrician or the therapeutist to work it out alone.

Hartford Dental Society.

At a preliminary meeting held Saturday evening, February 13, 1897, the Hartford Dental Society was organized and the following officers elected: Dr. L. C. Taylor, president; Dr. Edward Eberle, secretary and treasurer; Drs. J. W. Harper, chairman, L. G. Chapman, and E. R. Whitford, executive committee.

The first regular meeting was held at the Hotel Hartford, Saturday evening, February 27. Dr. James McManus related the circumstances of the formation of a dental society in this city in 1865, and read a record of the same from the August Cosmos of that year.

The society adopted the Code of Ethics of the American Dental Association, and starts with a membership of twenty-two, including the above-named officers and the following: Drs. Jas. McManus, G. L. Parmelee, N. J. Goodwin, J. F. Wright, H. J. Fisk, Charles McManus, Monroe Griswold, F. W. Dunham, Ellen R. Carr, Henry McManus, G. M. Griswold, C. H. Riggs, W. A. Damon, F. E. Mix, and J. F. Doebler, all of Hartford; Drs. F. T. and F. T. Murlless, Jr., of Windsor Locks, and Dr. M. M. Maine, of South Manchester.

Edward Eberle, *Secretary*,
26 Pratt street, Hartford, Conn.

Harvard Odontological Society.

At the annual meeting of the Harvard Odontological Society, held in Boston, February 27, 1897, the following officers were elected for the ensuing year: Waldo E. Boardman, D.M.D., Boston, president; Joseph T. Paul, D.M.D., Boston, recording secretary; Edward B. Hitchcock, M.D., D.M.D., Newton, corresponding secretary; Lyman F. Bigelow, D.M.D., Boston, treasurer; Henry L. Upham, D.M.D., Boston, editor; Joseph T. Paul, D.M.D., Frank T. Taylor, D.M.D., William P. Cooke, D.M.D., executive committee.

Edward B. Hitchcock, *Cor. Sec.*,
Newton, Mass.

DENTAL SOCIETY ANNOUNCEMENTS.

American Dental Association.

QUESTIONS SUBMITTED FOR DISCUSSION BY LOCAL SOCIETIES.

1. Pyorrhea alveolaris; what is it and how many varieties are there? Are all local in origin or constitutional, or both? What is the treatment, local or constitutional, or both? What may be regarded as a cure? Is the disease likely to recur?

2. *a*—What is the cause of dental caries? *b*—Why is caries so much more active in some mouths than in others? *c*—What changes take place where caries ceases its activity in mouths heretofore predisposed? *d*—Are there recognizable signs by which we may know whether or not caries will cease with advancing age?

3. To what extent are we justified in giving our patients systemic treatment?

4. To what extent and when are we justified in using cataphoresis? Is there danger of injuring the dental pulp or other tissues by its use?

5. What can we do to increase the attendance at our dental societies?

6. In view of the recent investigations has amalgam been a blessing or a curse to humanity?

7. Are there any proofs that the mercury in amalgam fillings is injurious to the health of the patient?

8. What are the best materials for filling teeth and the prospective durability of fillings in different cases?

9. What are the best methods of bleaching teeth?

L. P. Bethel,
A. W. Harlan,
J. N. Crouse,
Committee on State and Local Organizations.

Illinois State Dental Society.

The thirty-third annual meeting of the Illinois State Dental Society will be held at Peoria, May 11 to 14, inclusive, 1897. An excellent program is in the course of preparation. Members are urgently requested to be present. The profession, generally, is cordially invited. A reduced rate of one and one-third fare has been granted from all points within the state.

Louis Ottofy, *Secretary,*
Masonic Temple, Chicago.

Florida State Dental Society.

The fourteenth annual meeting of the Florida State Dental Society will be held in Ocala, May 4 to 7, 1897, inclusive. All members are urged to be present.

W. McL. Dancy, D.D.S., *President,*
Carrol H. Frink, D.D.S., *Secretary,*
Fernandina, Fla.

Alabama Dental Association.

The Alabama Dental Association will meet in annual convention in Birmingham, April 13 to 16 inclusive. No pains have been nor will be spared to make this a memorable event in the history of the society.

All dentists cordially invited.

The State Board of Dental Examiners will meet at the same time and place as this association, and all who desire to enter practice in Alabama are notified to appear for examination.

J. H. Crossland, *Secretary,*
Montgomery, Ala.

Iowa State Dental Society.

The meeting of the Iowa State Dental Society will be held in Des Moines May 4 to 7, 1897, inclusive. W. G. Clark, *Secretary*, Cedar Rapids, Ia.

EDITORIAL.

The Endowment of Dental Research.

We publish elsewhere a letter from Dr. C. E. Kells which is self-explanatory. The object which it sets forth is indicative of a tendency to rise above the mere material side of dental practice, and to further ends which are sought to be attained in that class of work which is not only scientific in character, but when carried out to its final issue means the greatest practical good to the greatest number. The history of dentistry, as well as of all other departments of human endeavor, demonstrates that those who are by nature and education fitted for the prosecution of original research bear but a small proportion to the whole mass of workers. To be a successful original investigator requires certain natural endowments which are given to but few individuals. Nature reveals her hidden secrets to those only who have learned how to question her, and who are able to interpret her answers; she demands of her devotees absolute fidelity, uncompromising honesty, unflinching accuracy, absolute self-abnegation, and never-flagging enthusiasm in her cause. To meet these conditions requires the expenditure of much time and energy, and just in so far as the time of the investigator is occupied with matters foreign to his calling will his results be curtailed. When we consider the incalculable good which is the outcome of the work of the true student of nature, even if we place no other estimate upon it than the sordid one of dollars and cents, it must be evident that when a man has demonstrated his fitness for such lines of work, and where his work has a practical value for all the members of his craft, it would pay well to utilize his abilities for the general good by placing him beyond the demands which the necessity for maintenance imposes, thus securing for all those advantages which the entire devotion of his abilities to scientific research would entail.

This subject in its specific application is not new; it has been from time to time talked about among those who have appreciated the work of Dr. Black, and has by the editor of the *Dental Digest*, in a recent issue of that journal, been the subject of editorial comment.

There was a time, and within easy memory of practitioners

now living, when a suggestion of the character set forth in the letter of Dr. Kells would have been regarded as the vaporing of a wild enthusiast; perhaps there are some who either from selfishness or through inheritance of old traditions may still so regard it; but it is a significant fact that a not inconsiderable number of men in the dental profession have spoken with favor of the object here under consideration, and it may be true, and it will be cause for much congratulation for those favoring such an idea should it appear, that a sufficient number can be found who are willing to carry out a plan whereby the object set forth in Dr. Kells's letter may be accomplished.

With a view to practically testing the matter, the DENTAL COSMOS requests an expression of opinion by letter from all who are sufficiently interested in such a plan to signify their approval of it, and to state what amount of cash they are severally willing to donate to a fund to be created for the purpose outlined. This request is made solely for the purpose of testing the feasibility of such a plan, and to determine whether in the professional progress of dentistry it has yet developed to a point where it is willing to unselfishly undertake a work of this character. When that question has been decided, it will then be time to arrange the details for the creation and care of such a fund.

In connection with this subject, the DENTAL COSMOS has the assurance from Dr. J. Leon Williams that he will continue his investigations in the histology and pathology of the dental tissues, a fact upon which the whole dental profession may be congratulated. His interest for the immediate future is centered in the study of the embyrology of marsupial teeth. His opportunities for securing suitable material for that study are somewhat restricted; there are doubtless many members of the profession so situated that they could easily obtain the much-needed material for this study.

Dr. Williams desires particularly the heads of kangaroos, opossums, etc., and in addition the heads of sargus or sheepshead. He gives the following directions as to the care and treatment of material, and desires that the heads be those of embryos if possible:

"The best general fixing and preservative fluid is made by adding one-third methylated spirit to Müller's fluid. Material should be placed in the fluid as soon as possible after death, using a large quantity of the fluid in proportion to the size of the material, suspending the latter by a thread near the top of the fluid. The fluid should be changed every twenty-four hours during the first three days, after that twice in a week, and it may then be bottled, sealed,

and forwarded. In bottling the material for shipment, cotton wool should be placed at the bottom of the bottle, the material laid on this and packed about with more cotton wool to prevent it from coming into contact with the sides of the vessel; then the bottle can be filled with the preserving liquid. In removing the head or jaws of the embyro, great care should be exercised not to make the least pressure upon the jaws over the developing teeth."

Material so prepared may be forwarded to Dr. J. Leon Williams, No. 30 George street, Hanover Square, London, England, and will be conferring not only a personal favor upon Dr. Williams, but indirectly a great benefit upon the whole dental profession.

We ask for the foregoing suggestion the earnest consideration of our readers, and the practical expression of their interest as far as it may be within their power.

BIBLIOGRAPHICAL.

NOTES ON THE HISTORY OF ANÆSTHESIA. THE WELLS MEMORIAL CELEBRATION AT HARTFORD, 1894. EARLY RECORD OF DENTISTS IN CONNECTICUT. By JAMES MCMANUS, D.D.S. Printed for the Author by Clark & Smith, Hartford, Conn., U. S. A., 1896.

The writing of history is generally a labor of love, and often love unrequited. Certainly in the present instance these interesting historical notes have been prepared by one whose devotion to the subject has always been intense, and the spirit of that devotion is manifested throughout the book. Dental history, that which records the birth and development of our specialty, must necessarily be made up of or based upon the collected gleanings which qualified individuals have made each within his scope of observation. The contribution which Dr. McManus has made in the volume before us is one of first value. It deals with one of the most important, yes, the most important contribution which our profession has given to humanity—and it is well done. The author has well earned the gratitude of the whole dental profession for his interesting and able presentment of it.

OBITUARY.

Dr. James A. Swasey.

The following action has been taken by the Chicago Dental Society, on the death of Dr. James A. Swasey:

We are called upon to mourn the death of one whose face will no longer be seen in our midst, Dr. James Atwood Swasey, for many years an active member of this society.

This sad event occurred early in the morning of December 24, at his residence, 3017 Michigan avenue, Chicago.

Dr. Swasey had been in his usual health up to about the middle of November, when he first noticed that he was suddenly breaking, and for a few days he went to the West Baden Springs; but not finding the desired relief, he returned to his summer home in Michigan, and from thence came to Chicago, where he died surrounded by his family and friends.

Dr. Swasey was the president of this society when the twenty-fifth anniversary was celebrated in 1889. He was president of the Odontological Society of Chicago in 1894-95, a member of the Illinois State Dental Society, the American Dental Association, and a member of the first International Dental Congress, Paris, France, 1889. He was also the first president of the Chicago College of Dental Surgery, and was re-elected for several years. He was an honorary member of several dental societies, state and local, in the United States.

The society loses one of its best representatives in the death of Dr. Swasey.

He was a man of strong character, high-minded and generous, with a pleasing manner, modest in his estimate of his own acquirements, ever ready to counsel and assist others.

He was a firm friend, a strong partisan, energetic and industrious, an inventor of many appliances, and devoted to his profession to the last.

We will miss his familiar face and hearty grasp of the hand in all of our subsequent sessions.

We mourn with his family in this hour of affliction, and extend our sympathies.

We place these lines of respect to his memory in our journal records, with the thought that his life had been useful to the community where he had resided for so many years, and with the ever present hope and belief in the immortality of his spirit forever and forever.

Be it resolved that a copy of this tribute be sent to his family, and others to the dental journals for publication.

(Signed by A. W. Harlan, Truman W. Brophy, F. H. Gardiner, committee.)

Dr. George C. Brown.

The following resolutions were passed at a special meeting of the New Jersey State Dental Society, Friday, February 5, 1897, at Newark:

Whereas, It has pleased Almighty God to remove suddenly from the midst of his active labors our fellow-member and treasurer, Dr. George C. Brown;

Resolved, That this society hereby desires to place upon record their high appreciation of his manly Christian character, and of his high professional standing, as well as his genial and pleasant presence;

Resolved, That we mourn his death as a personal as well as professional loss, and hereby desire to testify of our high appreciation of his efforts he always and at all times gave to the profession of his adoption, and his devoted activity to the advancement of its welfare;

Resolved, That we mourn with his afflicted family, and extend to them in this hour of trial our sympathies;

Resolved, That a copy of this resolution be sent to his family and be placed upon the minutes of our society, and be published in the journals devoted to dentistry.

(Signed by C. S. Stockton, F. C. Barlow, J. Allen Osmun, chairman.)

Dr. Eli Slegel.

Died, at his home, 1405 Perkiomen avenue, Reading, Pa., March 10, 1897, of catarrh of the stomach, Dr. Eli Slegel, in the sixtieth year of his age.

Dr. Slegel was born November 23, 1836, at Fleetwood, Pa. At the age of eighteen he left the farm to study dentistry at Coatesville, Chester county, Pa., with Dr. W. Thompson. He completed his studies under Dr. Lukens, of Philadelphia, and went to Reading in March, 1857, where he practiced until his fatal illness compelled him to desist.

Dr. Slegel was of a kind-hearted and genial disposition, ever ready to relieve suffering humanity and forgetful of self. He was a profound lover of nature and her works; his beautiful home and its surroundings testify to his tastes in that direction.

He had a warm heart for his profession; was always interested in the proceedings and ever present at the meetings of the Lebanon Valley, State and American Dental Societies, of which he was an active member. He had the respect of all who came in contact with him, professionally or otherwise. He was a close student, and added many useful improvements to his art; notably a porcelain gold band crown, which was favorably received and largely used. He was connected with many organizations; in faith he was an Evangelical Lutheran.

Dr. Slegel was married November 18, 1862, to Hannah C., daughter of Samuel Heckler, of Reading, Pa. The family consisted of two sons and a daughter; Dr. Samuel Slegel, who assisted his father, and the widow alone surviving.

Dr. G. M. Renn.

Died, at Sunbury, Pa., January 6, 1897, of paralysis, Dr. George M. Renn, in the seventy-second year of his age.

Dr. Renn was born in Sunbury in September, 1825. His early years were spent on a farm near that place. He went to Northumberland and learned the carpenter's trade, and was subsequently employed in Philadelphia as the foreman of a piano and billiard-table factory. Returning to Sunbury, he took up the study of dentistry, and entered into practice there, where he became one of the pioneer dentists of that section of the state. His practice was a long and successful one.

Dr. Renn was postmaster of Sunbury under President Lincoln's administration. He also served three terms as burgess of that place. He was a close student, and was considered a good Shakesperian scholar. He was a member of the Susquehanna Dental Association, and was at one time its president. His wife died in 1894. Three sons and one daughter survive them.

DR. FRANCIS PEABODY.

PROFESSOR FRANCIS PEABODY, president of the Louisville College of Dentistry, died January 30, 1897, at Fort Meyers, Florida, whither he had gone in the hope of recuperating from the effects of a nervous breakdown due to overwork. He had been in failing health for some time, but was able to attend to his duties until about two months previous to his death.

Dr. Peabody was born in Boston, Mass., January 22, 1833. He went to Louisville as a young man, and began the study of dentistry with his uncle, Dr. W. H. Goddard. After studying with his uncle for some time he went to Cincinnati, and graduated in due course from the Ohio Dental College. He married before the civil war, and went to Tennessee with his wife and two children. During the war he lived near Nashville, but took no active part on either side, though his sympathies were known to be with the Confederacy.

His wife and one child died shortly afterward, so Dr. Peabody returned to Boston with his remaining child, a daughter, whom he gave in care of his sister. He then returned to Louisville and again began the practice of dentistry with his uncle, Dr. Goddard. He remained there until 1871, when he went to Brazil and practiced his profession in Rio Janeiro. He again returned to Louisville, where he remained until his death.

In 1882 he married Miss Nannie E. Williams, who, with two children, survives him.

Dr. Peabody was one of the best-known dentists in Kentucky. He was elected to the faculty of the Louisville College of Dentistry in 1888, and was president of that institution for about six years. He had been the president of the Kentucky State Dental Association, and chairman of the Board of Censors. He was a member of the National Association of Dental Faculties, American Dental Association, Southern Dental Association, and Mississippi Valley Dental Association. He was elected president of the Falls City Dental Club last year.

He was an enthusiastic student, an able teacher, and a practitioner of skill and ability.

The Louisville College of Dentistry and the Hospital College of Medicine, through their committees, adopted suitable resolutions upon his decease. His remains were cremated.

HINTS, QUERIES, AND COMMENTS.

SWISS BROACHES IN TREATMENT OF ROOT-CANALS.—To my idea, one of the most useful instruments in the treatment of root-canals is the "Swiss broach" or "watch-maker's needle," with the temper drawn enough to let the broach follow all irregularities of the canal, and at the same time retain a certain amount of rigidity. The broaches with the temper half drawn are best.

When on a visit to America two years ago, in conversation with many different practitioners I found some used broaches made from piano-wire; others, old worn-out nerve-extractors and canal-cleansers with the barbs removed, some polished, others rough, around which they wound cotton; and still others used small cotton ropes which they worked into the canal with broken or prepared broaches after great exertion and trouble.

The piano-wire broaches are very stiff and unsatisfactory. The roughened ones, more often than not, bring the cotton away with the broach, refusing to let it remain in the canal, and the polished broaches often slip through the cotton, thus failing to carry it any distance into the canal.

The use of the Swiss broach may be old to a great many practitioners, but this article is written to call the attention of dentists who are not familiar with it to one of the most valuable and useful instruments for treating root-canals.

A great many dentists do not use the Swiss broaches because they cannot be purchased ready prepared as the operator requires them. Although very inexpensive, a busy dentist has not the time to secure them from a watchmaker or jewelers' supply house, and prepare them himself. With the Swiss broaches, which are fine, smooth, three- or four-sided (four-sided preferred) needles, tapering gradually to a point, one has very little difficulty in placing cotton, as wished, in root-canals. One draws a few fibers of cotton from the cotton-holder; with these between the thumb and index finger of the one hand, places a broach among them with the other hand, and with a few revolutions of the broach the fibers are wound around the instrument into a little rope. This is very useful in drying out or placing applications in the canal. Where one has an assistant at the operating chair, a great amount of time may be saved by using several broaches, allowing the assistant to remove and renew the cotton as fast as used. If desirable to let the cotton remain in the canal, it is advisable to loosen it at the apex of the broach before dipping it into the medicine one prefers to use; then insert as far as wished, make a slight lateral pressure against the wall of the canal, and withdraw the broach. This is the easiest and most satisfactory way of drying out, as well as applying medicines to root-canals. One must use fine broaches and very little cotton, otherwise the operator will find it troublesome to carry the cotton any distance into the canal. With a little practice one becomes very dexterous in the use of these instruments, and ever after will never fail to keep a few at hand in his operating case.

Swiss broaches are without handles other than the natural shank, which may be cut off as short as one may wish in treating canals from an exposure on the posterior surface of the tooth. The sense of touch is greatly facilitated by holding the broach between the thumb and first finger without an intermediate handle, thus being in direct contact with the broach itself. After using a short time, one can readily ascertain the length of the canal, as well as whether the apical foramen is large or small. Of course great care must be taken not to push the broach through the foramen, thus causing irritation and perhaps infecting the apical tissues.—George Martin, D.M.D., D.D.S., assistant to Prof. Dr. Miller, Berlin, Germany.

"Dry Sockets."—In those cases characterized by Dr. Crawford "Dry Sockets," I think the most successful practice of a local sort consists in first thorough cleansing and disinfection with immediately induced bleeding sufficient to form a clot. This may be done with a spoon excavator or bur. I have often had this treatment followed by relief. We wish to have the socket filled in part by organized matter. If the hole is left open it is subject to irritation from everything that gets into it. A *clot*, it seems to me, is the physiological remedy, but be *sure* of cleanliness first.—Garrett Newkirk.

THE KEEPING QUALITY OF LIQUID NITROUS OXID.—We published in the DENTAL COSMOS of 1894, page 845, a note with reference to the keeping quality of liquefied nitrous oxid, and reported in connection therewith an instance where the gas had been used successfully and without diminution of its active properties after a period of five years.

We quote the following from the *Quarterly Circular* of C. Ash & Sons, Ltd., showing that the gas may be kept for a much longer period without undergoing decomposition. It would seem to indicate that under ordinary conditions the liquefied gas is not subject to alteration, and may therefore be kept indefinitely:

"We have received the following interesting note from Mr. T. Jenkin, of Malta, which goes to prove that nitrous oxid gas stored in iron or steel bottles does not deteriorate:

"'I thank you for your remarks concerning nitrous oxid gas. Since writing you on the subject, we have tried the gas you sent to me eighteen years ago and find it perfectly good.'

"A period of eighteen years is about as severe a test as the gas is ever likely to be put to in actual practice. So far as we are aware, this is the longest time on record that it has been kept by a dentist and afterward used."

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING FEBRUARY, 1897.

February 2—No. 576,089, to A. H. Butterfield. Dental engine.
" " No. 576,142, to Daniel Murlless. Rubber-dam clamp.
" " No. 576,471, to Frank Ritter. Dental chair.
" " No. 576,518, to E. D. Hinkley. Dental rubber-dam holder.
" *9*—No. 576,593, to H. S. Lowry. Dental appliance.
" " No. 576,722, to Wm. Caille, Jr. Tool-moistening device for dental hand pieces.
" *16*—No. 577,063, to J. T. Pedersen. Dental hand-piece.
" " No. 577,064, to J. T. Pedersen. Slip-joint for hand-pieces.
" " No. 577,254, to H. E. Hawksworth. Dental chair.
" *23*—No. 577,507, to Alfred Cane. Dental plugger.

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ORIGINAL COMMUNICATIONS.

A CONTRIBUTION TO THE STUDY OF PATHOLOGY OF ENAMEL.

BY J. LEON WILLIAMS, D.D.S., L.D.S., LONDON, ENG.

(Read before the New York Odontological Society, January 12, 1897.)

(Concluded from page 301.)

IN a paper recently read by Dr. Henry Gerhart before the Pennsylvania State Dental Society, on the "Etiology of Dental Caries," he asks Dr. Black how he knows that this zone, seen far in advance of the bacteria, is the work of the micro-organisms. The answer, of course, is perfectly evident from what I have just been demonstrating. The zone is caused by the action of acids excreted by the bacteria. That is so clearly shown by many of the illustrations accompanying this paper, where the appearance is produced artificially as well as naturally, as to make further comment on the point unnecessary.

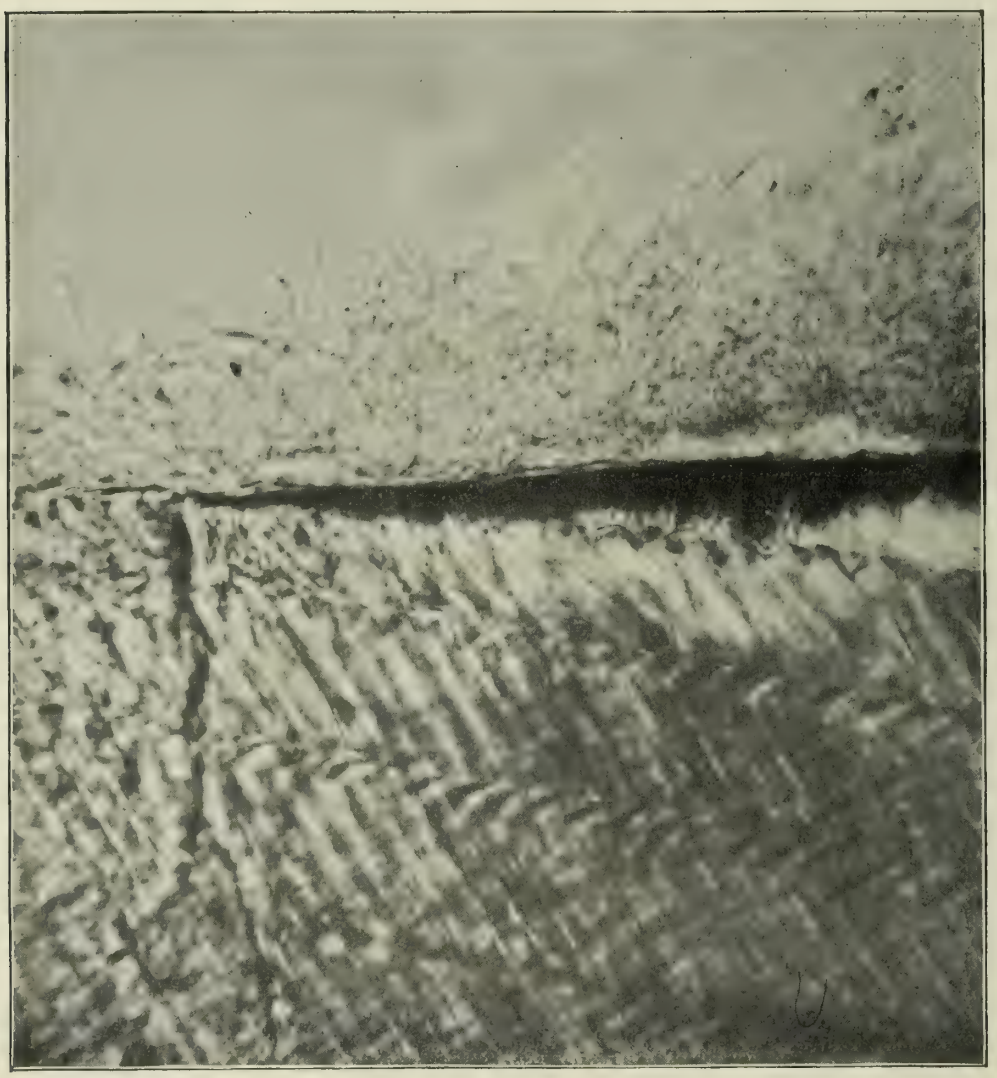
Fig. 69 shows bacteria attacking sound, well-formed enamel in the vicinity of a fissure into which no micro-organisms have entered, although the opening of the crevice is many times larger than the largest forms of bacteria. Throughout these investigations I have observed that the bacteria nearly always enter any fissures that may be present in backward, or what Miller calls "secondary decay" of enamel, while rarely entering any except very large fissures in direct decay.

In Fig. 70 it is seen that the acid has dissolved out channels between the enamel-rods and is splitting up the rods into their original formative sections for a considerable depth, and this effect is even more strikingly shown in Fig. 71, where the line of limitation between normal enamel and that penetrated by acid is very clearly demonstrated. The bacteria have been accidentally brushed out of the decayed spot in this specimen, but almost every phase of their action on the tissue is beautifully shown.

In Fig. 72 is seen the commencement of a cavity. In deeply pigmented and slow decay, such as is shown in this specimen, the acid penetrates but a short distance in advance of the point where the tissue is breaking down.

Fig. 73 illustrates one of the difficulties in making photographs of sections of this character. If sufficient exposure be given to bring out the detail in the deeply-stained enamel, the bacteria will often be so much over-exposed as to almost completely disappear. On the other hand, if the bacteria are stained, as in Fig. 74, and the

Fig. 69.



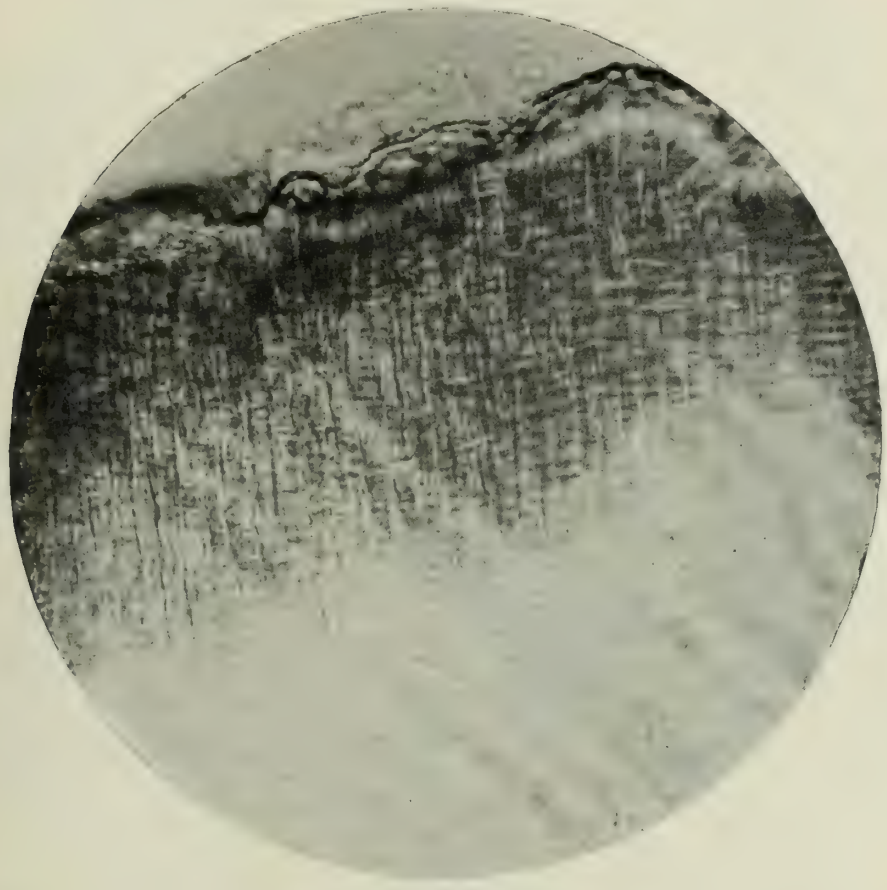
Section of Human Enamel, showing Micro-organisms destroying Normally Formed Tissue in vicinity of Fissure. × 500.

exposure made for the enamel, the deeply-stained mass of micro-organisms lying next to the enamel is much under-exposed. It will sometimes be found best to make two exposures, one for the enamel and another for the bacteria, and the two photographs, if properly made, will bring out all points. From the two illustrations which we have just seen we discover that the so-called granular layer of decaying enamel, which has been so often described, is simply a mass of densely-packed micro-organisms.

Fig. 75 shows the enamel nearly penetrated by decay. As is

usual in balsam-mounted specimens, the bacteria are slightly raised from the floor of the cavity. In this condition the micro-organisms are easily brushed away, and the appearances which are then shown are such as have led to the conclusion that bacteria are not directly concerned in caries of enamel. A curious and interesting phenomenon is shown in this and in the succeeding illustration (see Fig. 76). In both instances the bottom of the cavity, as shown, is bounded by a line of stratification of the pathological type, but in both instances the action of the acid of decay seems to have been arrested, at least temporarily, by this imperfection. The acid had probably penetrated along natural canals to

FIG. 70.



SECTION OF HUMAN ENAMEL, APPROXIMAL SURFACE OF BICUSPID. × 500.
Showing commencement of caries. Enamel-rods separated by solution of cement-substance and discolored by action of acid.

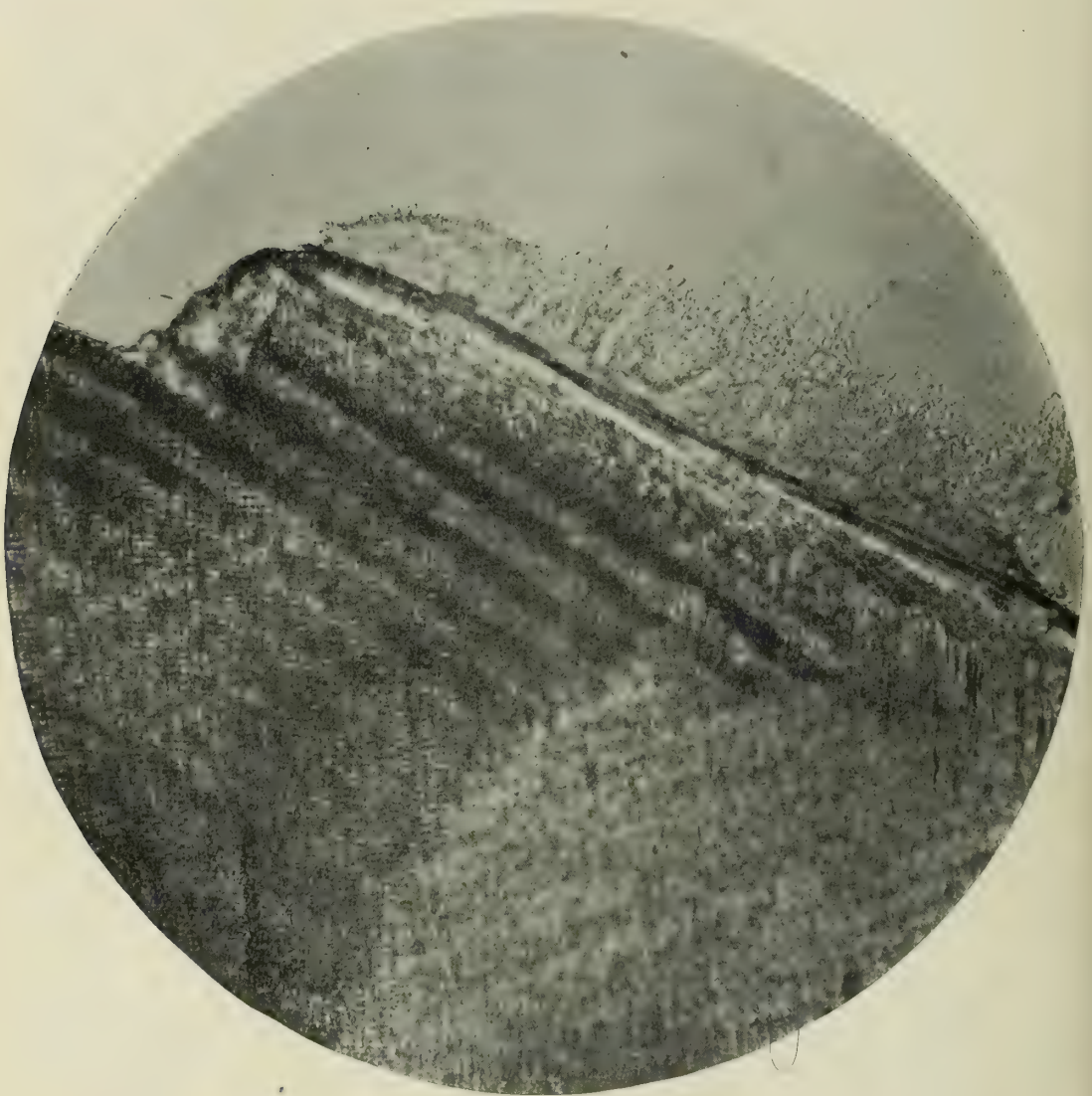
this point, and the termination of the canals here, or an abrupt change in their direction, has led to this temporary check in the penetration of the destructive agent.

In carefully-prepared specimens the ends of the enamel-rods at the borders of a cavity may always be seen sharply defined against the ever-advancing line of bacteria. From such appearances as are often shown at this point I have found that the destruction of enamel by bacteria is rarely accomplished by molecular disintegration, as claimed by Dr. Black, except so far as the cement-substance is concerned. The enamel-rods, as we shall see, break down in a more rapid manner because of their structural peculiarities. I should say, however, that this has reference solely to di-

rect or penetrating decay. In backward decay from the dentin it is probable that the enamel is largely destroyed by molecular disintegration, but this is because the loosened sections of the enamel-rods are prevented by the overhanging edges of sound enamel from being removed until they are completely dissolved.

In Fig. 77 we see the manner in which the enamel-rods are torn down at the commencement of decay by the solution of the cement-substance, which unites the sections of the rods and also the rods

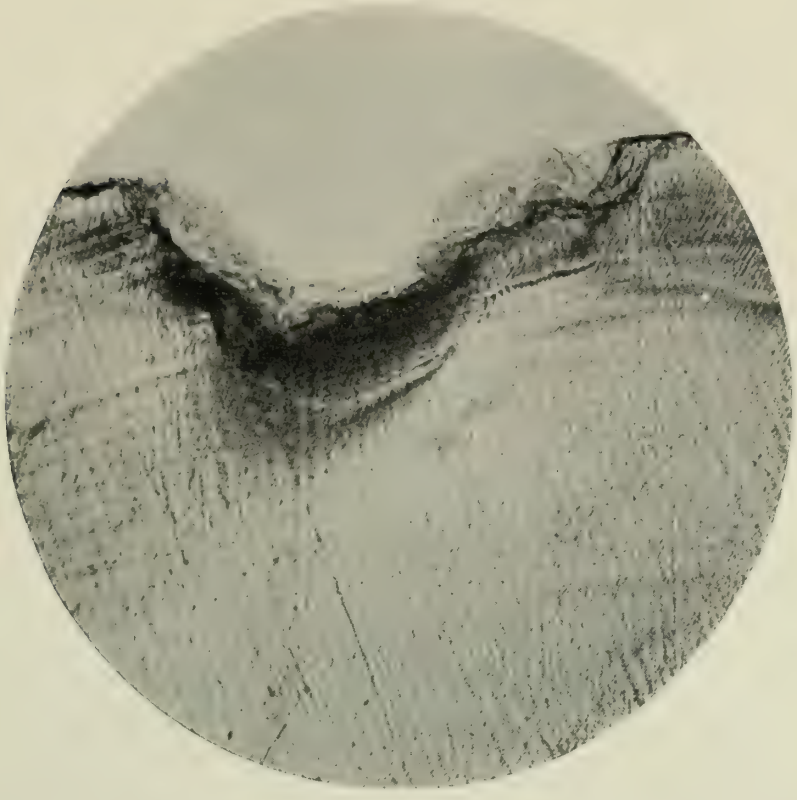
FIG. 71.



SECTION OF HUMAN ENAMEL, APPROXIMAL SURFACE OF INCISOR. × 250.
Showing micro-organisms of decay attached to the surface and marked effect upon tissue caused by the penetration of acid excreted by the bacteria.

to each other. The acid product of the bacteria, it is seen, has dissolved out the cement-substance between the rods for a short distance from the surface and is penetrating between the sections of the rods, several of which on the surface of the enamel are already loosened and falling away. As these sections fall away they are either completely dissolved in the mass of bacteria or are thrown out and washed away. The progress of direct enamel-decay, therefore, goes on, at least in many instances, much more rapidly than it would if the enamel were completely destroyed by molecular disintegration.

FIG. 72.



SECTION OF HUMAN ENAMEL, SHOWING COMMENCEMENT OF FORMATION OF CARIOUS CAVITY. × 200.

The cavity is everywhere seen to be lined by the felt-like mass of micro-organisms.

FIG. 73.



SECTION OF HUMAN ENAMEL SHOWING PROGRESS OF SLOW DECAY MARKED BY DEEP COLORATION OF THE TISSUE. CAVITY LINED WITH MICRO-ORGANISMS. × 250.

Fig. 78 shows this process going on in the deeper parts of a cavity which has nearly penetrated the enamel. The destruction of enamel in this manner may be compared to the method of tearing down a brick or stone building by the removal of the cement which binds the bricks or stones together. If we expose a section of enamel for a short time to a solution of lactic acid, we shall see that the effect is substantially the same as is shown in the mouth. From the illustration (Fig. 79) you observe the widening of the spaces between the rods and the separation of the rods into the original globular bodies of which they are composed by the solution of the cement-substance.

Fig. 74.



Showing Caries of Enamel. Micro-organisms Deeply Stained. × 200.

If, now, we carefully remove the bacteria from a few sections we may observe still more clearly the effects of their acid product upon the enamel. Although the appearances vary somewhat in accordance with peculiarities of structure (see Figs. 80 and 81), there are always to be seen the enlarged spaces between the enamel-rods and the separation or division of the rods into their formative sections. Fig 82, showing caries of enamel under a power of two thousand diameters, is a very instructive specimen from several points of view. The cement-substance is almost completely dissolved away, and the original organic matrix, the product of the ameloblasts, now, of course, completely calcified, is most strikingly exhibited. When this is compared with appearances which I have shown in and immediately beneath the ameloblasts in forming enamel, I entirely fail to see how any one can doubt the method of

the development of this tissue. There are many places where the organic connections, the radiating processes, which unite the globular bodies in each rod, and often those of contiguous rods, are plainly seen. Here is the full explanation of what has been called by the Heitzmann school "the return to an embryonal condition." But how different the processes by which this appearance is produced, and how different all the facts in connection with it from what Bödecker and Abbott have described. Their whole theory

FIG. 75.

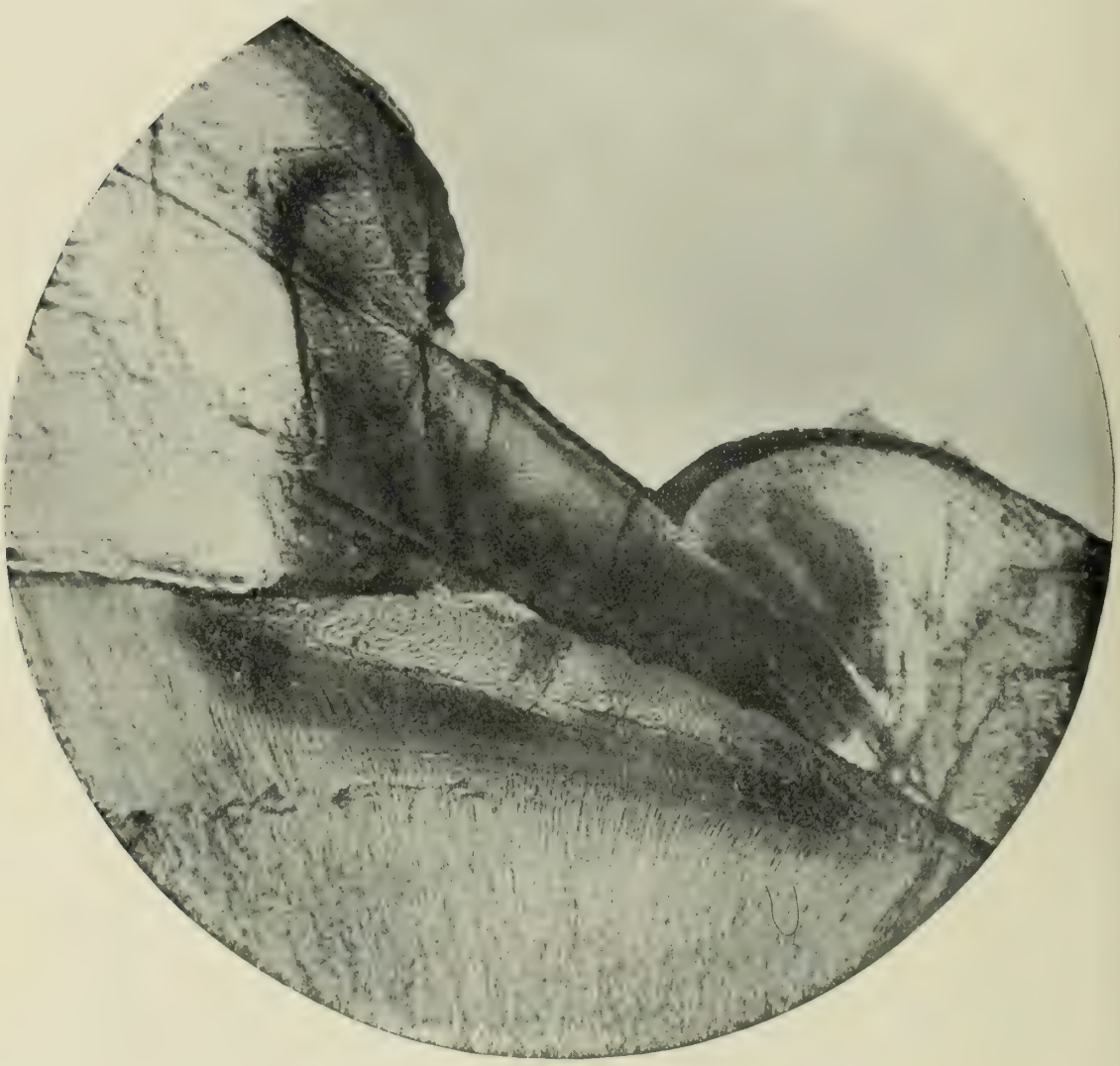


SECTION OF HUMAN ENAMEL, APPROXIMAL SURFACE OF INCISOR. × 175.
Showing enamel nearly penetrated by decay. The carious process apparently arrested by a line of stratification. Micro-organisms slightly raised from floor of cavity by shrinkage caused by mounting in balsam.

on this point is completely overturned by the simple fact that precisely the same condition of enamel as is here shown can be produced in a tooth that has been dead for a hundred years. In other words, it is purely a chemical process, and consists in the removal by an acid of the veil of cement-substance which always conceals the true structure of enamel. There is no vital reaction because there is nothing vital to react. There is no physiological or anatomical change. The structure which you see has always been there from the time the tissue was formed, but in normal enamel it

is covered up and hidden by the cement-substance which causes its calcification. Those who teach that enamel is formed without a definite structural matrix are just as far from the facts as Bödecker and Abbott have been,—farther, in fact, because these investigators saw the necessity for an explanation of appearances that could not be explained by the older teachings.

Fig. 76.



Section of Human Enamel, Approximal Surface of Molar. × 150.
Showing decay temporarily arrested by a line of stratification. Micro-organisms deeply stained.

After caries has completely penetrated the enamel, the progress of decay becomes much more rapid. The line of least resistance seems to be the exact point of union between the enamel and the dentin. This is what one might expect, as both tissues are usually more imperfect at this point than elsewhere. Whenever cavities or channels are found extending into the enamel they are filled with masses of bacteria or micrococci—chiefly the latter. This phase of caries is well shown in Figs. 83 and 84. A curious and interesting fact in connection with backward decay is that the bac-

teria seem far less adhesive than those which line the cavities in direct decay, so that in the preparation of the specimen all of the micro-organisms except such as are protected in cavities and channels are generally torn out and washed away. It is evidently a case of necessary adaptation to environment. In direct decay they must literally cling together or be worsted in the struggle for existence, but in the sheltered conditions of backward decay they can take life more quietly, serenely, and with indifference to mu-

FIG. 77.



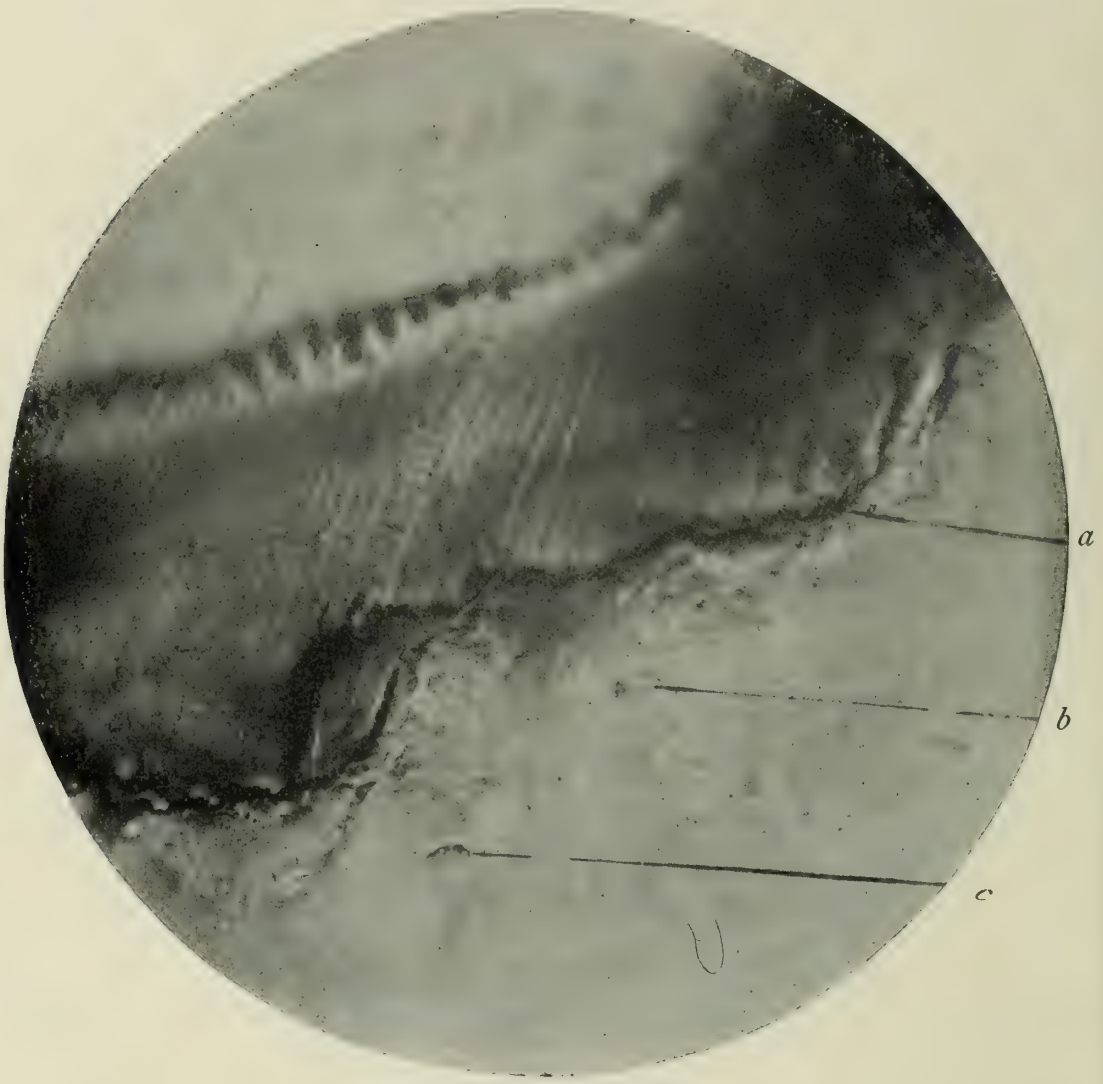
SECTION OF CARIOUS ENAMEL, SHOWING DESTRUCTION OF TISSUE BY SOLUTION OF CEMENT-SUBSTANCE AROUND ENAMEL-RODS AND GLOBULAR BODIES. × 500.

a, *b*, Globular bodies of enamel-rods loosened and set free by action of acid excreted by thick mass of micro-organisms attached to the surface of the tissue.

tual relations. In direct caries I have only occasionally found small groups of micrococci and bacteria deep in the substance of enamel, where they had evidently penetrated by means of some channel communicating with the cavity of decay, but in backward caries fissures are nearly always present filled with micro-organisms, as shown in Fig. 85. If a section of enamel where backward decay is in progress be exposed to an anilin dye, the stain is quickly taken up (see Fig. 86), and the resistance of this stained enamel to the action of acid alcohol shows the presence of bac-

teria. If a little of this white, partly-decomposed enamel be scraped away with a spoon excavator and spread out on a cover-glass and stained in the usual way, we shall find on making microscopical examination many places resembling the views shown in Figs. 87 and 88. In successfully-prepared specimens certain forms of micro-organisms, chiefly micrococci, diplococci, and two or three forms of bacteria, are always to be seen lying between the

FIG. 78.

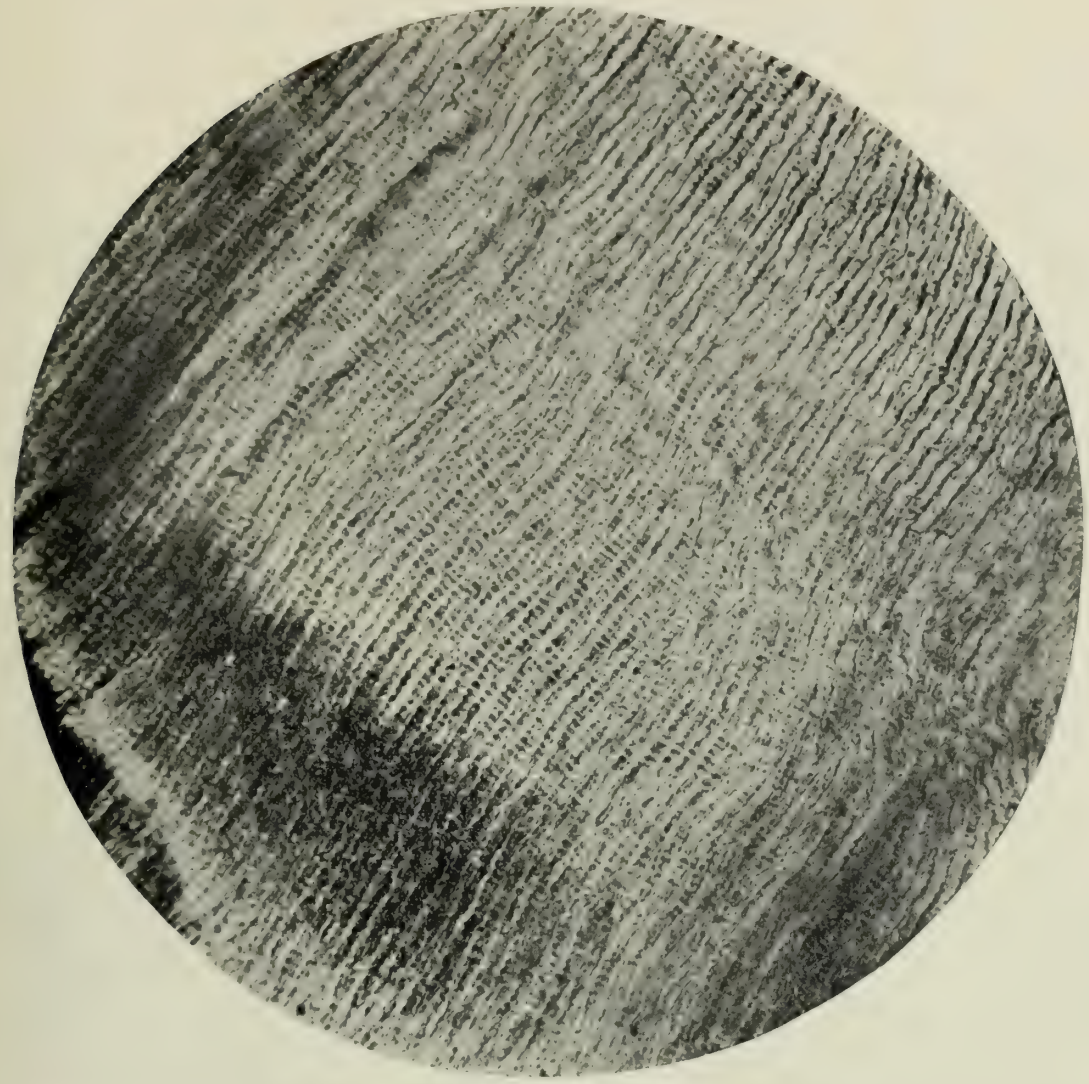


SECTION OF CARIOUS ENAMEL. × 500.

a, Ends of enamel-rods at margin of cavity. It is seen that there is no "granular layer" of enamel at the margin of decay, as has so often been described, but the enamel-rods end sharply at the surface where the micro-organisms are attached. The so-called "granular layer" of carious enamel has probably been produced by faulty methods of treatment by which the thick mass of bacteria has been converted into an appearance of granular decaying enamel; *b*, *c*, Globular bodies or sections of enamel-rods loosened and set free by action of acid of decay.

enamel-rods and sometimes between the sections of the rods. Here, in deep backward caries, the process is the same as in direct decay, although so much more rapid that there is usually little or no discoloration of the enamel in secondary decay. As the acid produced by the micro-organisms dissolves out the cement-substance between the rods, the bacteria insinuate themselves deeper and deeper in the depressions thus formed. The acid is continually

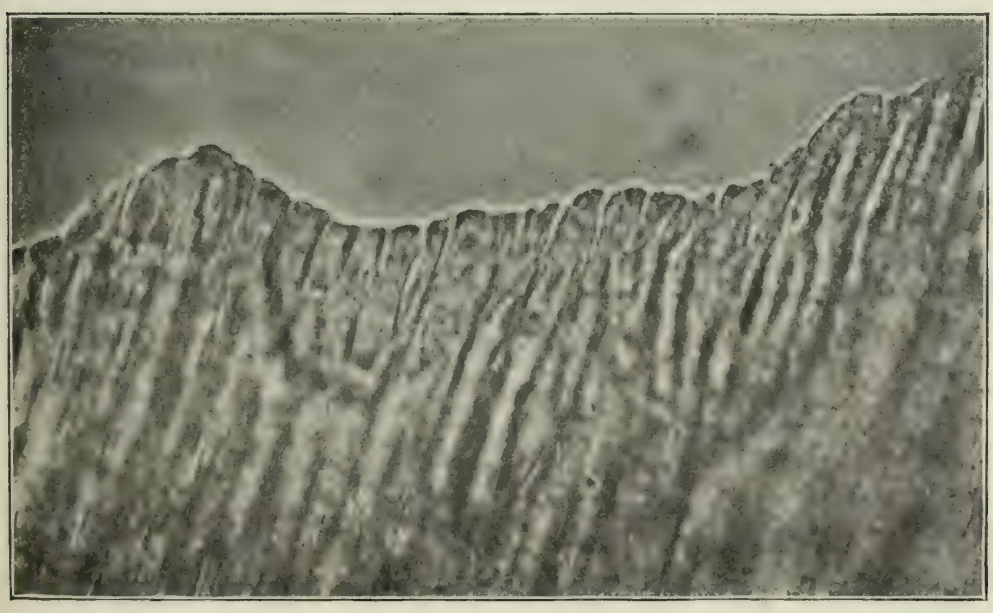
FIG. 79.



SECTION OF NORMAL HUMAN ENAMEL. × 250.

Treated with lactic acid to show solution of cement-substance between enamel-rods and globular bodies.

FIG. 80.



SECTION OF CARIOUS ENAMEL. × 600.

Bacteria of decay removed to show action of acids on ends of enamel-rods.

being formed and its full dissolving power continuously acting on the tissue. With the removal of the cement-substance the loosened rods and sections fall apart, and the work of destruction is finished (see Fig. 88). It will be interesting to you to know that the microscope reveals something in the nature of an explanation of one of the causes of the difference between slow and rapid caries. A comparison of Figs. 59 and 82 will show a very marked contrast in the structure of the enamel. In both the cement-sub-

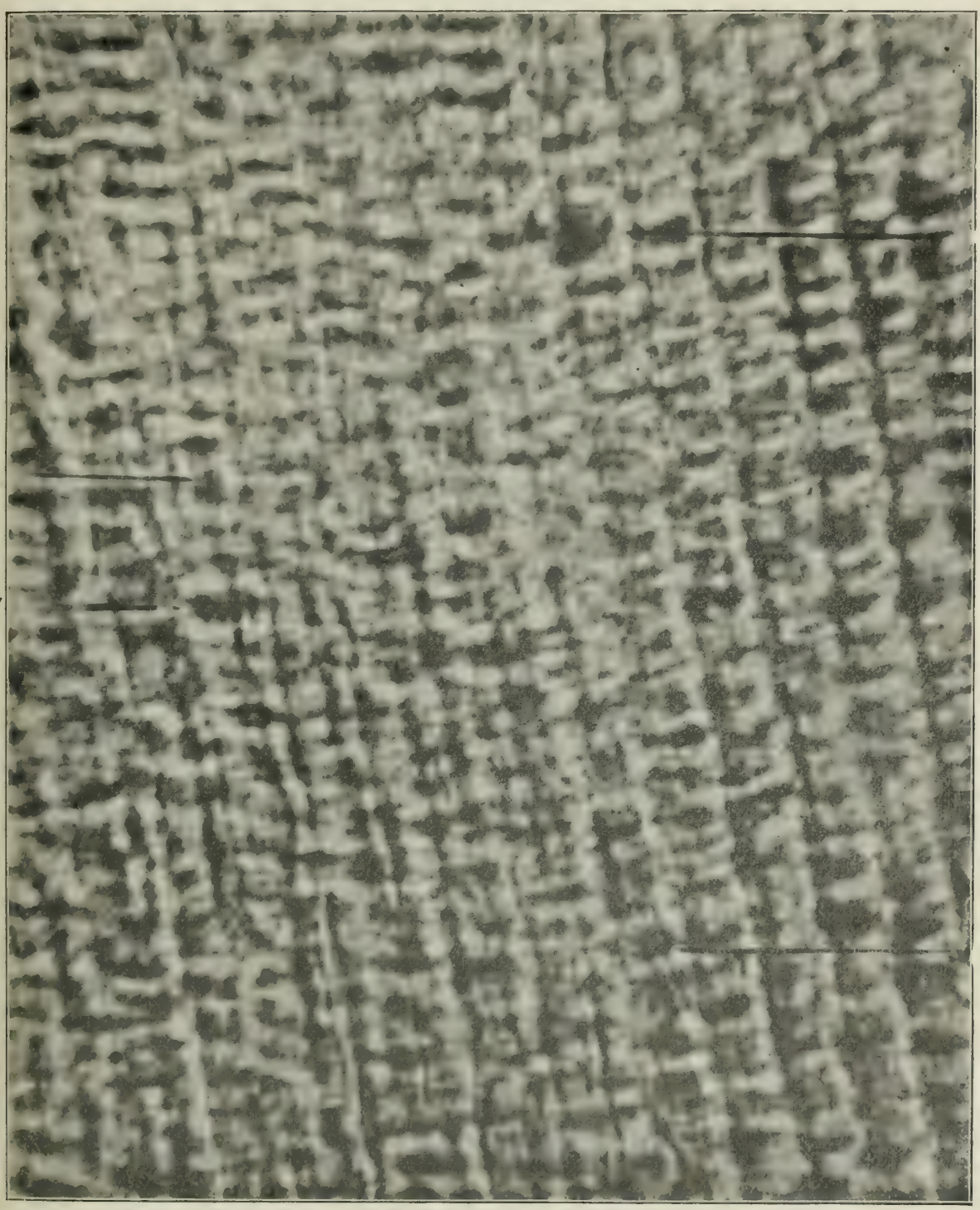
Fig. 81.



Section of Carious Enamel. × 550.
Bacteria removed to show action of acid on enamel-rods.

stance has been largely removed by the acid bacteria, and the structure of the basis-substance, representing the original organic matrix, is revealed. In the case of slow decay shown in Fig. 82, the globular bodies, the original formative sections of the rods, are everywhere seen to be firmly united to each other, both in the lateral and perpendicular aspects, by projecting processes, as I have already described. It is easy to see that this form of structure would resist the action of the acid longer than that shown in the case of rapid decay illustrated in Fig. 59. Here the removal of the cement-substance leaves the rods almost completely isolated,

FIG. 82.



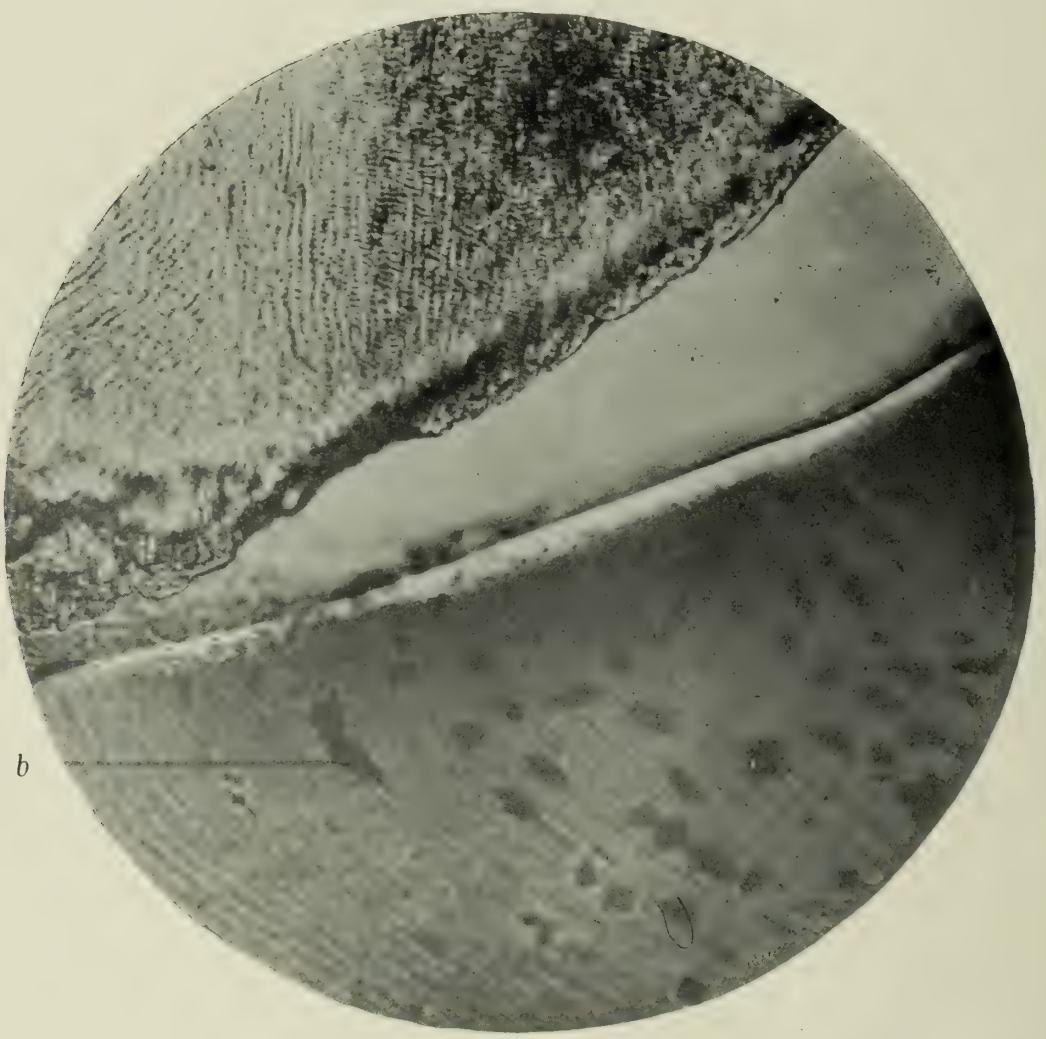
SECTION OF CARIOUS ENAMEL, SHOWING APPEARANCES OF TISSUE IN SLOW DECAY. × 2000.

The cement-substance has been dissolved away by the bacterial form of the acids, thus exposing to view the original organic matrix. The globular bodies or sections of the rods shown at *a*, *b*, *c*, *d*, and seen to be identical in general shape and character with those previously shown in the ameloblasts and on the surface of forming enamel.

and they therefore fall apart, and the structure of the tissue is destroyed before the complete solution of the lime-salts. Such structure as is shown in Fig. 82 evidently does not break down completely until the tissue is nearly destroyed by molecular disintegration.

I have further observed that there are marked differences in the ultimate granular structure of the enamel-rods, the granules being much finer in some specimens than in others, even when the specimens are quite normal in other respects.

FIG. 83.



SECTION OF CARIOUS TOOTH, SHOWING APPEARANCES OF DECAY IN ENAMEL AND DENTIN AT THE LINE OF UNION OF THESE TISSUES. × 250.

The dark spots shown in the enamel and dentin at *a* and *b* are masses of micro-organisms.

There may also be a difference in the resisting power of the cement-substance, but the wide variations in the conditions of environment and in the structure, as shown, seem to be quite sufficient to explain the marked differences which are clinically observed as to the rapidity or slowness of decay.

I had hoped to be able to make a more extensive report on the special forms of micro-organisms concerned in enamel-decay, but my paper has already considerably exceeded prescribed bounds.

Investigations are in progress for determining, if possible,

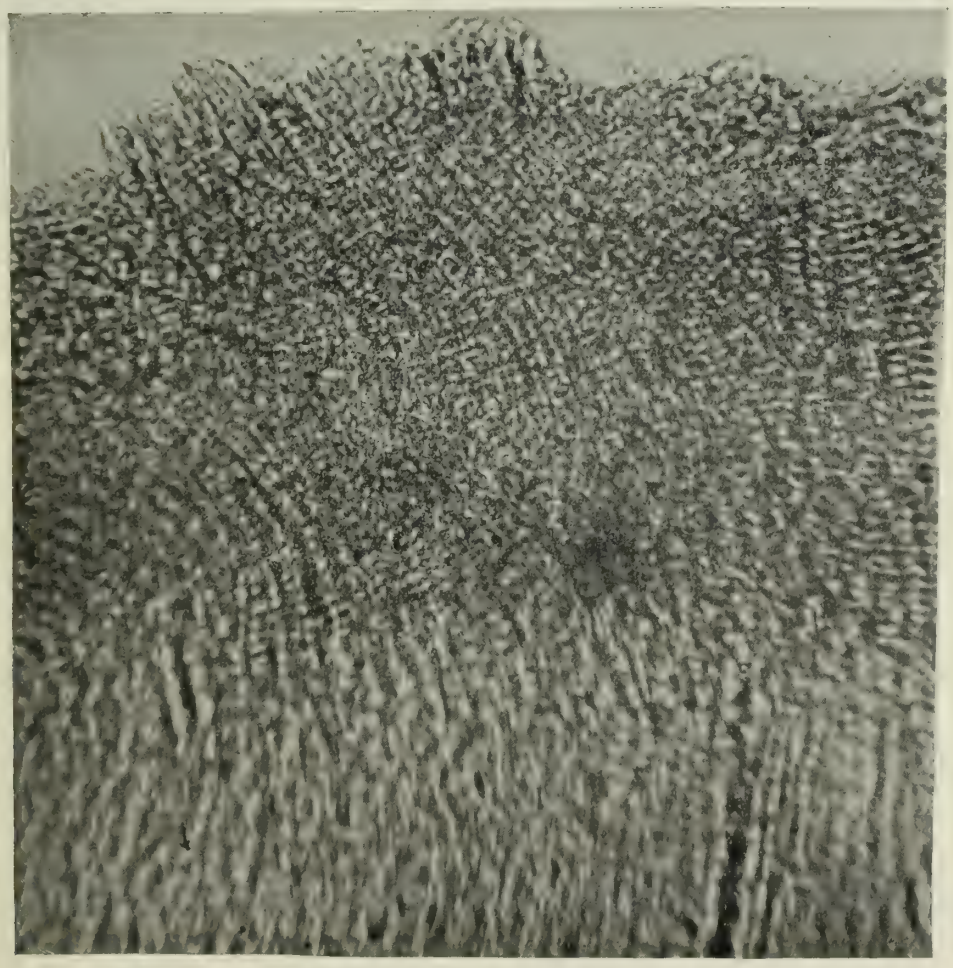
FIG. 84.



TISSUES IN SECONDARY OR BACKWARD DECAY OF ENAMEL FROM THE VICINITY OF *a* IN THE PRECEDING ILLUSTRATION. × 750.

They are seen to be filled with deeply-stained masses of bacteria and micrococci.

FIG. 85.



SECTION SHOWING BACKWARD DECAY OF ENAMEL. × 350.

The stained area in the lower half of the illustration shows the depth to which the bacterial acids, and in many cases the bacteria also, have penetrated in advance of the actual breaking down of the tissue.

whether special forms of bacteria are invariably present in markedly rapid decay of enamel. In the few cases which I have had the opportunity of examining, I have invariably found that the streptococci shown in Fig. 89 far outnumber all other forms. But much careful work is necessary before forming conclusions on such points. It is a matter of common observation that teeth which have for years been comparatively free from caries are suddenly attacked, and for a time decay very rapidly. The opinion

FIG. 86.



COVER-GLASS PREPARATION FROM SCRAPINGS OF WHITE, OPAQUE DECAYING ENAMEL. × 450.

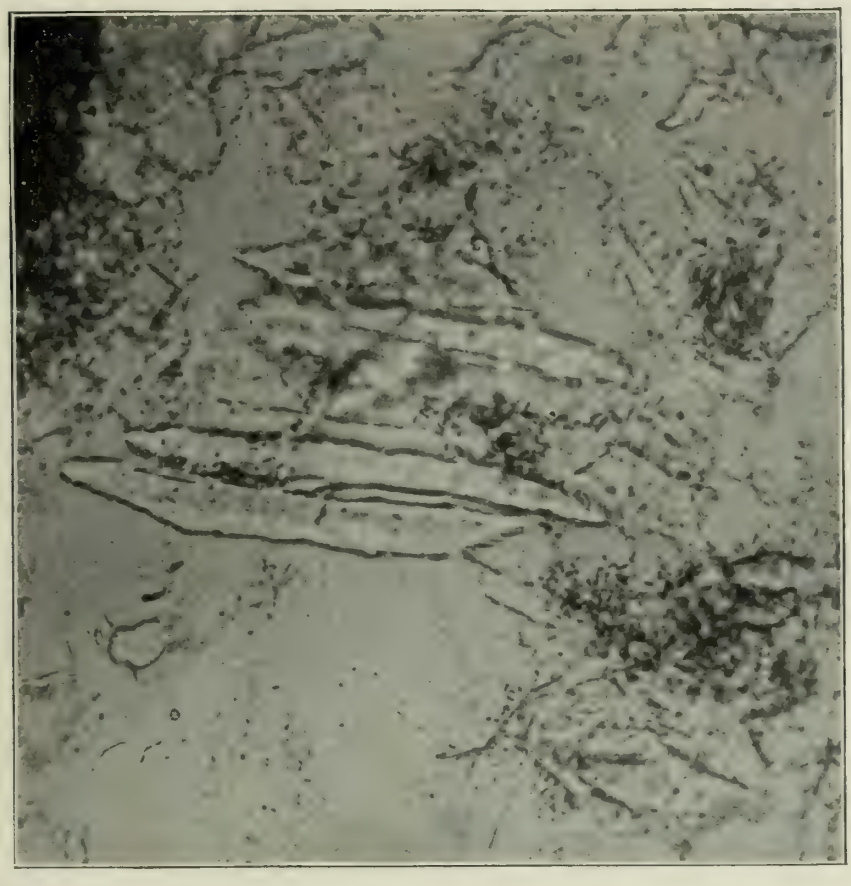
The cement-substance between the rods is seen to be dissolved away, and the crevasses thus formed are filled with round and oval forms of micrococci and bacteria. Stained by the Gram method.

has long been held by a majority of the profession that this change is due to the degeneration of the tissues of the teeth. I have shown that so far as enamel is concerned there is not the slightest foundation for this opinion. A careful study of this phase of caries demonstrates that persistent and rapid fermentation is always going on in such mouths. In all such cases it is evident that some change in the fluids of the mouth has occurred which decreases their inhibitive power over the development of micro-organisms,

and acid-forming bacteria seem to proliferate rapidly and to act with great energy. The observed differences in rapidity of decay, therefore, are primarily due to change in environment, somewhat accelerated or retarded by such peculiarities of structure as I have pointed out. Given a certain condition of the oral fluids which favors the development and activity of bacteria, and it is obviously true that poorly-constructed enamel will decay more rapidly than a solid and perfectly-calcified tissue.

In direct caries of enamel one finds the cavities always lined with various leptothrix and thread-like forms (Figs. 90 and 91). The

FIG. 87.

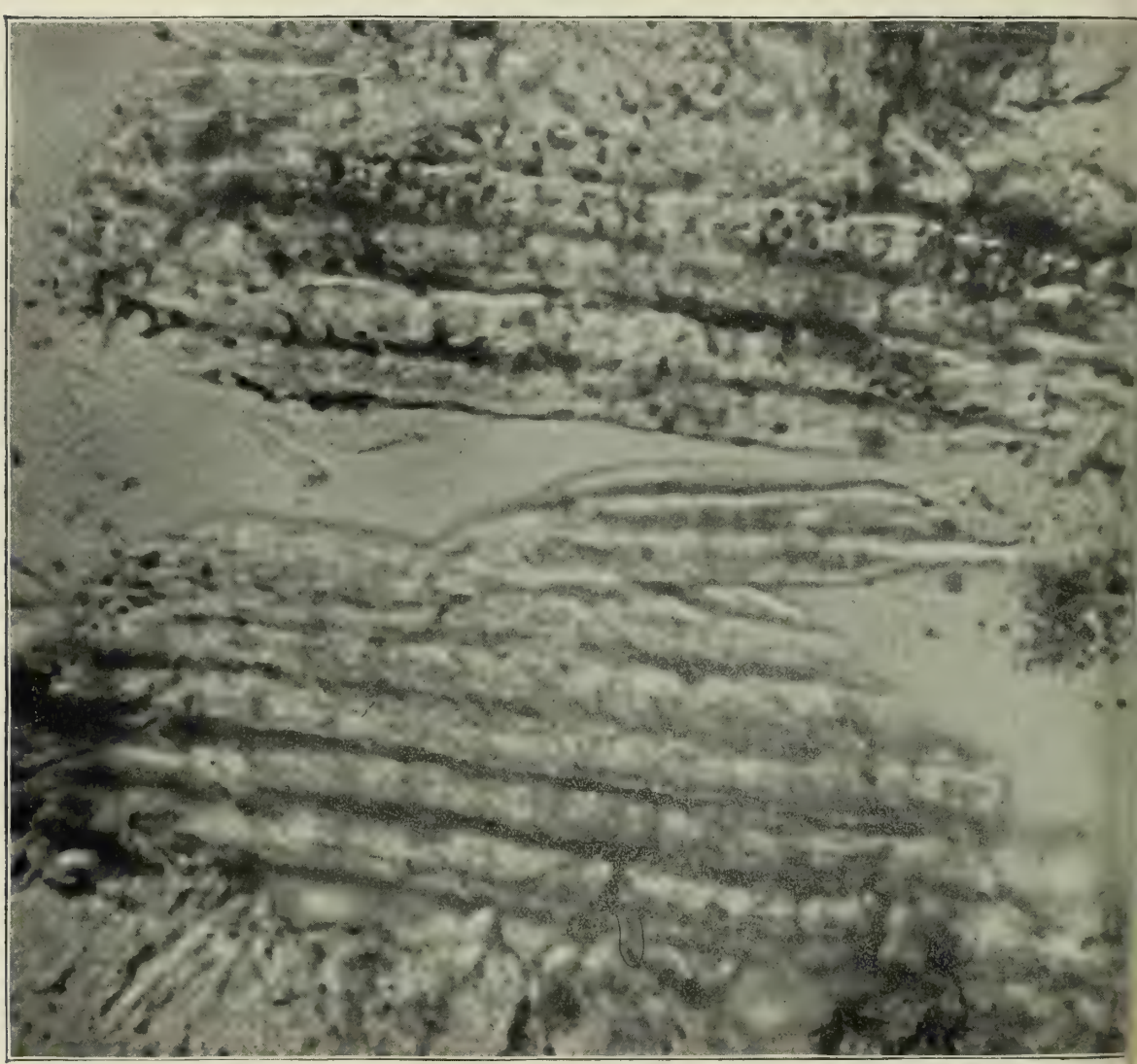


COVER-GLASS PREPARATION. × 600.
Same treatment as in the preceding specimen.

Leptothrix buccalis maxima and the Bacillus buccalis maximus of Miller are nearly always found, the former in large masses lightly stained, if the Gram iodin method has been used, and the latter more sparingly in numbers, but deeply stained (Fig. 92). I have invariably found beneath the thick felt-like mass of thread forms, and lying in contact with the decomposing enamel in direct decay, and also deep in cracks and fissures in backward or secondary decay, a curved bacillus which appears to be much smaller than Spirillum sputigenum, as figured by Miller, a short, thick bacillus usually constricted in the center, probably the second kind mentioned by Vignal and Galippe as being invariably present in carious teeth, but most abundantly large micrococci and diplococci

(see Figs. 93, 94). These will always be found between the enamel-rods in backward decay and lying in little depressions, caused evidently by their excretory acid, in direct decay. They stain quickly and deeply by the Gram method. The final result of the work of these micro-organisms is strikingly shown in Fig. 95, where the tumbled and broken ruin is all that remains of that once beautiful structure, the enamel of a tooth.

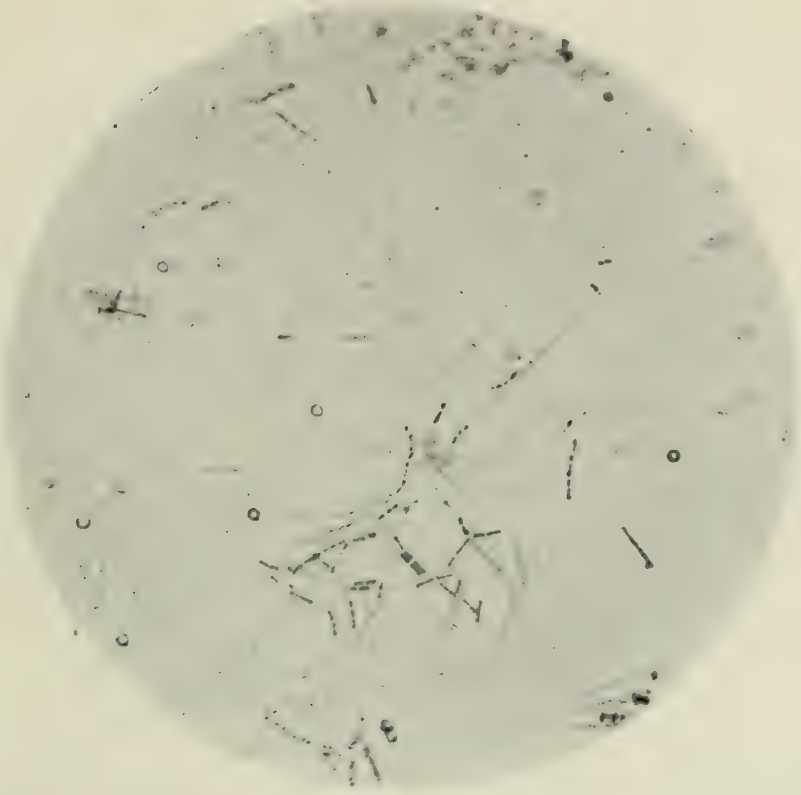
Fig. 88.



From Cover-glass Preparation of Decaying Enamel. × 1500.
Stained with Squire's carbolic fuchsin. Micro-organisms, chiefly micrococci and diplococci, are everywhere seen lying between the enamel-rods.

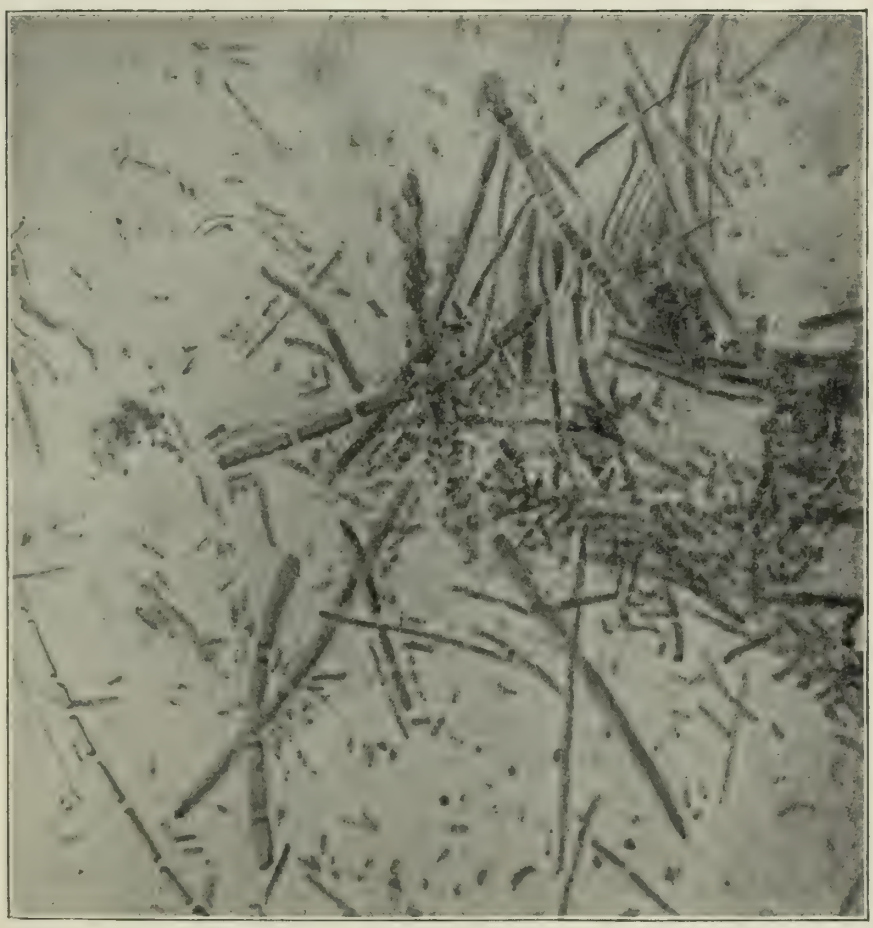
Gentlemen, my demonstration is finished. I have presented a long string of facts about which I have expressed few opinions, because opinion did not seem called for, as the facts explain themselves. The evidence, considered in detail and in mass, is simply overwhelming. There seems no reason why any rational man should continue to doubt that acid-forming bacteria are the sole active cause of dental caries, or that the predisposing cause is to be found in that "peculiar condition of the bodily juices and cells in which these are unable to repel the invasion of pathogenic

FIG. 89.



A FORM OF STREPTOCOCCUS FOUND ABUNDANTLY IN MOUTHS WHERE VERY RAPID DECAY OF THE TEETH IS IN PROGRESS. × 750.

FIG. 90.



SCRAPINGS OF MICRO-ORGANISMS FROM THE APPROXIMAL SURFACE OF A DECAYING TOOTH. × 1500.

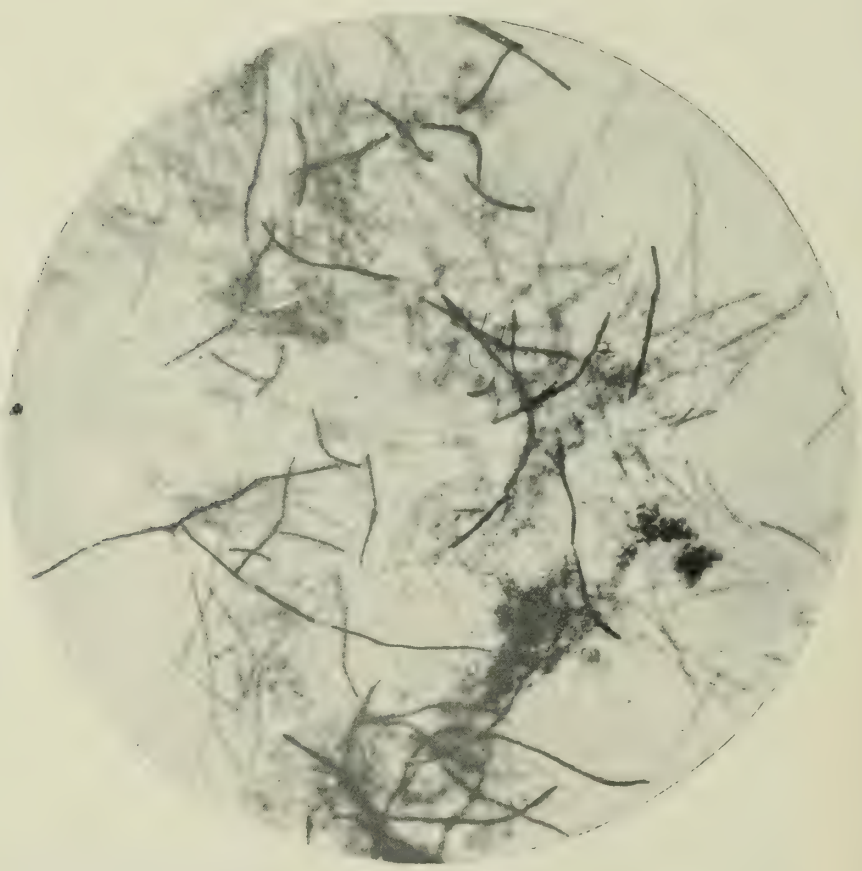
Shows the Leptothrix buccalis maxima and the Bacillus buccalis maximus of Miller.

FIG. 91.



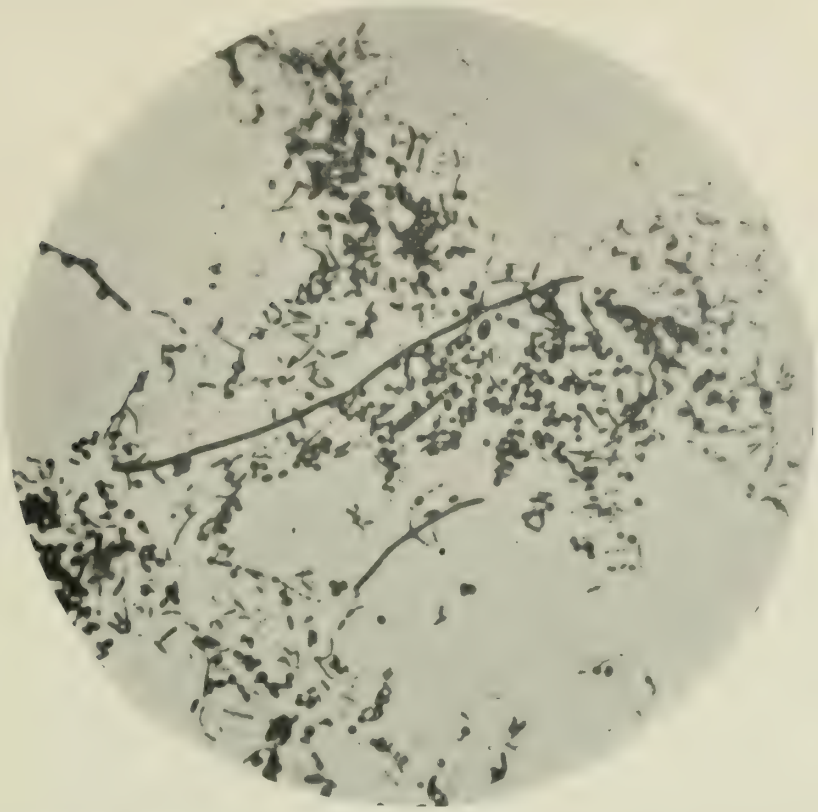
LEPTOTHRIX FORMS OF MICRO-ORGANISMS FROM DECAY OF ENAMEL. × 1000.

FIG. 92.



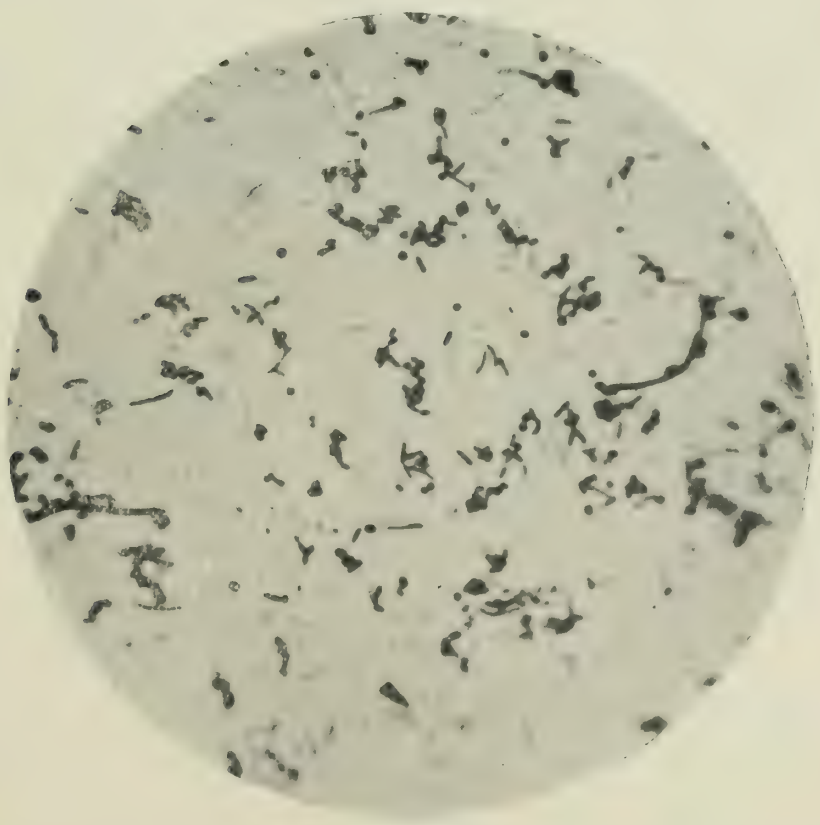
COVER-GLASS PREPARATION OF SCRAPINGS FROM DECAY OF ENAMEL. × 850.
Stained by Gram method. Shows Leptothrix buccalis maxima and Bacillus buccalis maximus of Miller.

FIG. 93.



VARIOUS FORMS OF MICROCOCCI AND BACTERIA FROM DECAYING ENAMEL. × 1000.
Photograph by Mr. Andrew Pringle from author's cover-glass preparation.

FIG. 94.

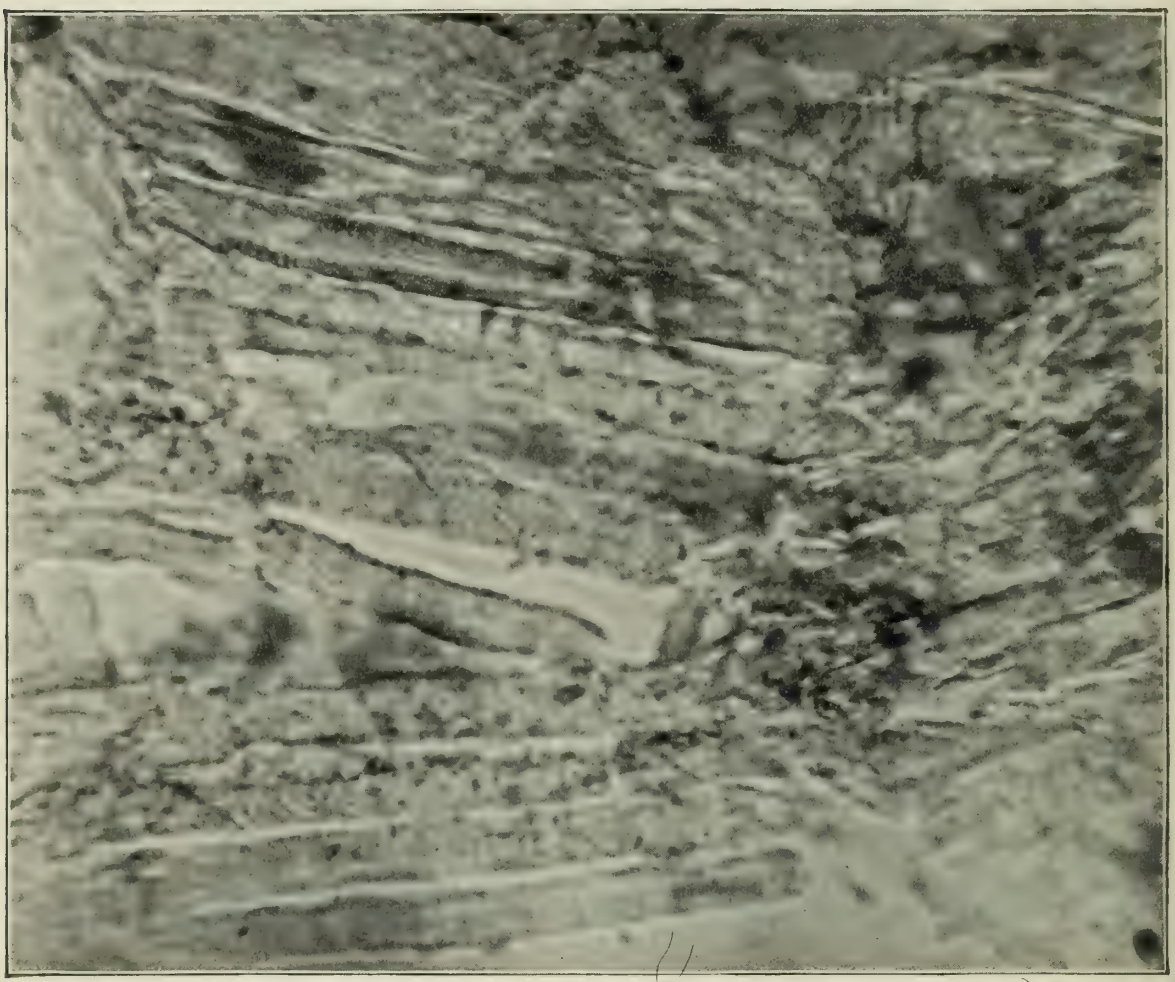


MICROCOCCI, DIPLOCOCCI, AND BACTERIA FROM DECAYING ENAMEL. × 1000.
Photograph by Mr. Andrew Pringle from author's cover-glass preparation.

micro-organisms." Tooth-structure is seen to play but a very subordinate part in the phenomena of decay, and to be of small consequence except in relation to the active and true predisposing cause of caries.

From the facts now in our possession we may, I believe, sum the whole question up by saying that if the environing conditions of

FIG. 95.



SHOWING FINAL DISRUPTION AND DESTRUCTION OF ENAMEL-RODS NEAR THE MARGIN OF A CAVITY OF DECAY. × 1500.

the teeth are such as to favor the development and activity of acid-producing bacteria, and if those bacteria are permitted to become attached to the surface of the enamel, it is doomed, although it may be the most perfect that was ever formed. On the other hand, if those environing conditions are not present the worst enamel will not decay.

A System of Measurement of Teeth, and Some Ideal Cavities.

BY DR. E. K. WEDELSTAEDT, ST. PAUL, MINN.

(Read before the First District Dental Society of the State of New York, February 9, 1897.)

There is a lack of a system of measurement that can be generally used by dentists. We cannot deny that we have absolutely no intelligent method of stating to one another, in a way that can be apprehended, much less comprehended, anything as regards the sizes of the crowns of the human teeth or the sizes of any of the cavities we fill.

The question is, ought this to be so?

Ought we not to have a system that those having the interests of operative and mechanical dentistry at heart can use, so that one speaking or writing on these subjects can make them so plain that any one may readily understand precisely what is meant, who is willing to study very little and keep, as many do, a careful record of his work? The satisfaction one would derive from a careful system of records, the knowledge that would be gained in the future, is such as to more than pay one for the slight trouble and the little study.

Why those who have written on cavities and gone into detail as regards cavity preparation, and into the most minute particulars, have never thought to place the cavities they have so carefully prepared in such a light before those who, from necessity or otherwise, have been compelled to study their books or articles, is beyond my comprehension.

Had such a course been pursued, any one could easily make similar cavities, and with greatest ease grasp at once what was intended by the writer. This could easily have been done, and it will be, let us hope, ere any more books on operative dentistry are published. Let us hope the day is past when we will sit and hear again the words, "The seat was flat and broad." Let us hope we may never hear again, "The rubber was scraped until it was so thin I had fears the plate would break from the force of mastication."

If seats are spoken of, let us state how many millimeters broad they were from the lingual to the buccal. Their general width from the axial angles to the margin of the cavity can also be stated in millimeters and tenths of millimeters. The thickness of plates can also be measured, so that we may know at once what is intended. We are, as a profession, behind the times in this regard. If any one doubts this, let him on the morrow go into a carpenter shop and say, "I desire a shelf for my closet." The first question the carpenter will ask will be, "What size?" Let any of us go into a hardware store and ask for a piece of round iron, an auger, or a chisel. "What size?" will invariably be the question.

None can deny that these are facts; and this being so, it is about time that we, as a profession, knew more about our own work, and at least have some slight knowledge of the size of the

instruments and the work with which we deal. We are wholly devoid of anything of this nature in all branches of dentistry. We must sooner or later have some system that will be adequate for our needs and that will be standard. Other members of the profession seem to recognize this also, for on page 743 of the DENTAL COSMOS for 1895 Dr. G. V. Black has an illustration of his micrometer, which is the first of the kind. Others have prophesied there would be some standard system of cavity measurement. "Such a system may not commend itself to those who have grown old in the profession without it, but it is of infinite importance to the teacher in communicating his thoughts to students, and to the future of dentistry." The day has come, and cavity measurement is a reality. It has come, and come to stay. But to the subject.

That unit of the metric system known as the millimeter was chosen as a standard for my own work by Mr. C. S. Sutter, of St. Paul. When asked what he thought of diagrams of measuring appliances handed him for inspection, he asked for time to think, and in a few days brought a "Grossman" and a "Boley" millimeter gauge on which millimeters and tenths are registered. The general shape of the points of the "Grossman" had been altered, and a micrometer, capable of measuring any cavity in the teeth that was advantageously situated, was the result.

You are all aware, no doubt, that a millimeter equals a trifle more than one-twenty-fifth of an inch. It is therefore unnecessary for me to speak further as regards it. These micrometers can be purchased at houses selling manufacturing jewelers' supplies. The "Grossman" micrometer in my work is used for taking all the measurements, with the exception of the depth of the cavity, and for obtaining the breadth of the seat. Mr. Sutter has arranged a nut-and-screw apparatus, the measurements of which are read from the "Boley" gauge. If there ever arises a question as to the accuracy of the "Grossman," one can readily prove whether or not it is correct by proving up with the "Boley," which, not having a spring and being entirely of a different arrangement, is not liable to get out of order and can always be relied on as being correct. The nut-and-screw appliance any one can make; the threads run from fifty to one hundred and fifty to the inch. These instruments will be improved as different ones apply them for their own use. There are some things I should like to change, but these are the first made, and some allowance is requested for that; they sufficiently answer the purpose for the present. It should have been mentioned that "Grossman" micrometers can be purchased that register millimeters and twentieths of millimeters. Thus far in the work millimeters and tenths have answered, although a twentieth gauge is always at hand for any special measurement. It might be well, if any buy these "Grossman" micrometers and have the points altered by a mechanic, to take the "Boley" gauge and prove up on the "Grossman" before accepting them. Some little care is necessary in arranging the "Grossman" points for the purposes of measuring cavities, etc.

What are some of the benefits to the dental profession from the use of a system of measurements? Those who desire can obtain scientific data on many subjects of which little, and in many cases not anything, is known to-day. We can have tables of greatest importance to us all, of crowns of the teeth, their length, width, thickness, etc., cavities, seats, steps, anchorages, faceted contacts, and many other things which we will consider. How rapidly do the deciduous teeth grow? Does any one know? We certainly ought to.

The same can be asked as regards the permanent teeth. Do they grow more rapidly at night or during the day? It is well known that fruit ripens almost entirely at night. We need some literature on this subject of developing teeth; it is of importance. What is the size of the faceted contact on any of the teeth at any given age? Does any one know? Is there anything to be found in our text-books as regards contacts? Is it of importance to know more? How much are teeth shortened gingivo-occlusally in the mouth of a person at the age of fifty? They are frequently worn down almost to the gum. We have all noticed these cases. How rapidly do the teeth wear mesio-distally? If we look at the mesial or distal surface of an upper or lower first molar that has been in the mouth for forty years, if it has had a bicuspid resting on it on one side and a molar on the other, it is not an infrequent thing to find a large facet worn on the mesial and on the distal surface. How large is this wear, or, as it has been called, "faceted" contact? It is true, there is a table as regards the size of the facets, but it lacks an age column; without that it is not of much value. Many of the deciduous teeth have faceted contacts also. We move teeth frequently by mechanical means. How many millimeters can we move a tooth in a given time at a certain age? Teeth move of themselves frequently,—move too far and too fast for some of my patients, I regret to say. How rapidly do they move in their attempt to get away from where they once were? and what a pity it is they do not stay where they look best. Will it be of any importance to us, as a profession, to know more about the instruments we use,—the length and width of the blades of the excavators, the width of the chisels, and the diameter of our plugger points? Will it be easier to explain our plugger points by stating the plugger used was so many millimeters in diameter instead of, as at present, stating it is a "large-, small-, or medium-sized plugger"? I for one would like to know what that one term "medium-sized" plugger means. The plugger points in my office measure from three-tenths of a millimeter to three millimeters in diameter.

How much of the enamel is covered by the gum-tissue? At what age does it begin to shorten? I should like to ask how thick rubber plates are to be made? It has afforded me considerable pleasure to measure quite a number. The variation may interest you a little. One measurement reads five-tenths of a millimeter. They run from this up to five millimeters,—this for the palatal portion of upper plates.

Will it be of great importance to be able to say that any occlusal cavity which we may have prepared for filling was so large mesio-distally, so broad linguo-buccally at any given point that may be mentioned, and its general depth so many millimeters?

Would it be well for us to be able to speak in an intelligent manner as regards the cavities in each of the different teeth?

Many operators use porcelain inlays. Where these operations are written about or spoken of, would it not be well to know the size of the inlay? We do not know the size of the crown or pulp-cavities in the bicuspids or molars. There should be tables giving us some information as regards this. Quite a number of sections of teeth have been filed by myself, and many sections that others have filed have been examined and a careful record made of the sizes of the crown-cavities in these teeth. The table is most interesting; but as with the contact table, it is devoid of an age column. It is therefore only good for general information.

Every few weeks there appears a notice of some one's attempting to identify a person who has been dead for some time, perhaps one murdered or who has died in a foreign land. Recently a Boston dentist traveled to the city of Mexico for this purpose. A large life insurance depended on the man's being identified. What was the result? The dentist could not, I believe, swear positively it was the man for whom he had filled the teeth. Now had he a measurement of two cavities that had been prepared and filled, or had he the measurement of his teeth, all doubt would have been at an end upon making a remeasurement of cavities or teeth.

I believe ere a decade passes insurance companies will have the teeth examined and a careful record sent them of many of those whose lives are insured. The teeth of criminals will also be examined, and careful records made that may be of the greatest value to those interested.

Let us take a look at the crown of any tooth that has a live pulp in it. How far from the enamel does the pulp lie? It is nearer at some places and farther at others, and there is a difference according to the age of the patient. Would it not be of great assistance to us in our work to have a table of this distance? There is such a table, but it, too, is like the table of contacts,—it is devoid of any age column, so it is not of very much value.

Whenever an exposed pulp has been dealt with for the past eighteen months, a measurement has been taken of the distance from the margin of the cavity to the pulp-chamber. These measurements have been recorded and afterward compared with teeth of the same variety from which a section was cut. The measurements corresponded so closely that in the mass of cases it was one record. There can be little doubt that such a record will be of the greatest value if ever completed.

It is a common saying, in speaking of those cavities where the decay has extended over considerable territory without exposing the pulp, "It is pretty close to the pulp," or "That pulp has a fighting chance," etc. Conservative men occasionally take these

risks. Now, when a case of this kind comes to us, is it not well to have a record that will be of value in case the pulp should either live or die? We should receive much benefit from having the case in such shape that the future would find us prepared for any emergency. I hold it is of the greatest importance that we have this subject of pulps in particular on such a foundation that we can all gain some knowledge. Data will come quickly enough if a few will but help in this work.

For the last, let us take the crowns of the teeth. The term "teeth" will be used hereafter in speaking of them. Tables were spoken of as regards the length, width mesio-distally, and the thickness linguo-labially or linguo-buccally of teeth. This should, perhaps, have been considered first. It has been left for the last on account of the objection that could be raised, "There are not two teeth alike." For almost two years a careful record has been kept of the different sizes of teeth. It has been impossible to find two upper central incisors or two upper lateral incisors precisely alike, even in the same mouth. It was given up after one hundred different sets of teeth for one hundred different people had been measured. It would be impossible for me, without going beyond the limits of this paper, to go into detail as regards these hundred sets of teeth. It does not matter what the difference may be in the width of two upper centrals in the same mouth; the right one may be several tenths of a millimeter broader than its mate. The very next person may have these conditions reversed. What is the result in the end? The averages tell the story. The same rules were applied for all measurements of the different cases, so that there would be uniformity throughout. The length was obtained by measuring from the gum line to the incisal (labially). The mesio-distal width is measured as nearly as possible at the gingivæ; the thickness linguo-labio-gingivally from the linguo-gingival ridge through the middle, one point of the gauge resting on the ridge lingually, the other on the labial enamel. The incisal thickness was measured as near the edge as was possible, midway between the mesial and distal angles.

The table tells its own story.

Summary of Measurements of One Hundred Upper Incisors.

	RIGHT CENTRALS.				LEFT CENTRALS.			
Oldest 65 Youngest 9	Length	Width	Thickness Gingivally	Thickness Incisally	Length	Width	Thickness Gingivally	Thickness Incisally
Average.....	9.211	7.914	6.89	2.067	9.425	7.910	6.89	2.06
Largest.....	12.5	9.8	8.0	3.5	14.	9.8	8.1	3.85
Smallest.....	6.0	6.4	5.5	.55	6.6	6.4	5.95	.9

Oldest 65 Youngest 9	RIGHT LATERALS.				LEFT LATERALS.			
	Length	Width	Thickness Gingivally	Thickness Incisally	Length	Width	Thickness Gingivally	Thickness Incisally
Average	7.788	5.845	5.862	1.990	8.137	5.839	5.814	2 070
Largest	11.4	7.7	7.6	4.0	11 55	7.7	6.8	3.350
Smallest	5.2	4.0	4.3	.5	5.0	4 0	3.75	1.0

Practically the only difference in the average column is in the length of the exposed surfaces of the crowns. I regard this as due to the careless use of the tooth-brush. The difference between the largest and smallest columns is such as to cause some little surprise, but it is not such but that we can have comprehensive tables for general use, as far as many operations appertaining to our work are concerned, more especially rules that can be applied for cavity preparation. A study of this table is essential to those interested in this work.

I do not say that the next one hundred measurements would give me these same averages as regards length, but I do think the general averages of width and thickness, which are most important, would not, in the main, be altered. It would possibly be a trifle more or less, as regards the averages in general, but beyond this I do not think there would be very much change. It is with some difficulty that I leave this table of the measurements of these incisors. An entire evening's time could be taken up talking about the differences and some of the great surprises that were mine. We may hear more about this subject a few months hence, when I hope to be able to make more extensive investigations and have the tables of others to compare with my own.

When the difference in individual cases was first noted, I was surprised at so many of the teeth on the left side having so much more of the tooth exposed. It was but a few days ere a patient was noticed having much more of the teeth on the right side exposed. She was somewhat surprised when told she was left-handed, saying, "You look at my teeth and tell me I am left-handed. How do you know? Can you tell by my teeth?"

These averages do away at once with the idea of its being possible to find two teeth alike. It is therefore unquestionably practicable to have standard rules for cavity preparation. That there can be and will be rules arranged for intelligent men and students to follow goes without saying. I feel that there is a new era about to commence and new life about to spring up from sources long since supposed to be dead. It is about time.

That there are other uses in connection with dentistry that this system of measurement can and will be applied to is not doubted. This paper has treated of this system as used in my own practice, with one exception. No mention has been made of keeping

records as regards teeth separating from one another for the want of lateral support, too few cases having been observed and the records being too few for me to speak of them.

Soon after the cavity micrometers were received, a system for the measurement of cavities and a record was begun. At first some minor points were overlooked, such as noting the length of the cavities from the gingival to the occlusal, how deep the steps were cut, etc. As in all new work, we notice the necessity of these things as the work progresses. After using the system for several months and having a few records, the thought occurred, "How nearly do these cavities of which you have recorded measurements agree with those of which so much has been written by the 'masters of the craft'? How will they compare?" Twelve or fifteen different dentists were written to and asked to prepare several cavities for an investigation, so a comparative table could be arranged for study and for the profession; they should know of this, so that new work would be inaugurated and a system of study of operative dentistry started that would be much simplified, easily understood, and be what we have needed for many years. Quite a number of those written to for cavities prepared and sent them. I was at work on a comparative table of approximal cavities in bicuspids and molars when a request for an essay on this subject came. The work was new, and the few thousand measurements made were hardly enough to enable me to speak before this society with that authority which one would desire for an essay on this subject. I wished others to assist in this important work, and thus help place cavity preparation and several other things mentioned on a scientific foundation, and so decided to come to you with what I had, knowing full well that your charity was such as to overlook my shortcomings. In order that we might all receive much benefit from comparative cavity preparation, a series of five cavities was requested from Drs. G. V. Black, C. N. Johnson, and Edmund Noyes, to be used in connection with this essay, and brought here for your inspection. The cavities were: a mesial in an upper central; a mesio-occlusal in an upper first bicuspid; a disto-occlusal in an upper second bicuspid; a mesio-occlusal in an upper first molar (the last three to have occlusal anchorages); an occlusal cavity in a lower molar with the fissures cut out. All to be ideal cavities.

Each person written to prepared and sent me the cavities, and I also prepared a series for my own study and comparison.

As only green teeth could be used, much trouble was incurred in obtaining them. Dr. Slonaker, of Chicago, very generously supplied teeth on every occasion, but the very teeth we most wished could not be obtained. Several of the teeth with cavities prepared have checks in the enamel. These checks came after the cavities were prepared. You will notice them in one cavity that Dr. Johnson prepared, and in the series I have prepared one of the centrals is checked also. Since this was written the cavities have received much handling, and many checks in the enamel are noticed, although they have all been kept in water.

Careful operators do not fill mesial cavities in the central incisors that have the angle checked, without removing it.

After the four series of cavities had been arranged, your president was requested to obtain a similar series of cavities from some of the members of this society, so that we could compare the cavities prepared by different men.

Drs. Hodson, Nisley, Remington, Littig, Walker, and Nash all very kindly sent cavities. Each series has been placed on a wire and tagged, and you will be surprised, I think, at the different ideas we have of ideal cavities.

There is this to be said at present: Every man is a law unto himself when it comes to preparing ideal cavities in any of the teeth. The ideal mesial cavity in an upper central incisor "should have enough of the tissue toward the lingual and labial wall cut away to free the margins from contact with the adjoining tooth, and its gingival margin so cut that when filled the gum will cover the margin at that point." These are the principles laid down many years ago, and they are standard and ideal.

If the cavities are so shaped and care is used in filling, the results are, in the great mass of cases, ideal also.

The question is, How broad should the seats be in the central incisors? I do not know of a more difficult question to answer, for it depends wholly on two things,—the width of the tooth and the amount of territory the decay has usurped. Teeth with live pulps only are considered. The actual width of the seats in the cavities I have filled in these teeth shows a wide range, from 1.2 to 2.1 millimeters, the average being 1.6 millimeters. What is the width of the teeth? will be asked. They varied from 6.7 to 9.0 millimeters, the average 7.8½ millimeters. The width and length of the cavities, if any desire, I will cheerfully give.

You will perhaps understand the width of the seat better by looking at the outline of this central incisor (Fig. 1). It is the labial aspect of one enlarged forty-one diameters. Reference was made to the seat. You will notice the seat should extend pulpwise between 1 and 2. We have the measurements here of this tooth. Now, how near can we encroach toward that pulp and be on the safe side? The future alone can answer that question. It is not possible to do so at the present time. I should not be afraid, however, to make an average seat 1.6 millimeters in the great majority of cases, for the simple reason that after examining fourteen central incisors (labial aspect) they gave me these measurements:

Average (1), 2.2 millimeters, (2) 2.7 millimeters; largest (1), 3.7 millimeters, (2) 3.9 millimeters; smallest (1), 1.7 millimeters, (2) 2.1½ millimeters.

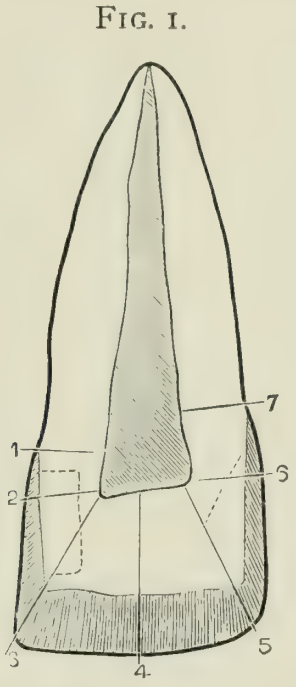
I believe, therefore, I should be on the safe side with a seat 1.6 millimeters broad, and unless there is some unusual stress on the filling, it answers every purpose and is sufficiently strong.

I wish I could spend the rest of the time speaking of central incisor cavities. Until the time came to write about them, I was not aware how much there was to say, but it must be left, after considering charts "C" and "B." (Figs. 2, 3.)

About six months ago a lady came to me with the left central incisor decayed around a gold filling, as illustrated in Fig. 2. The previous operator was a man of ability and well known. The tooth had been filled for three years. The criss-cross lines show the decay, and the round curved line the original filling. The filling I removed weighed sixty-nine milligrams; the one that replaced it took five hundred and seventy-six milligrams of gold. The square lines in the diagram show how the cavity had to be cut on account of the decay.

The very bugbear of my existence has been these small cavities, filled when I did not know better; and how many have returned to be refilled!

FIG. 1.



UPPER LEFT CENTRAL. BUCCAL ASPECT.

DIMENSIONS.

1	2.0	mm.	5	4.6	mm.
2	2.8	"	6	2.7	"
3	3.6	"	7	2.3	"
4	4.6	"			

Fig. 3 shows the beauty of not knowing better also. Three years ago I filled those two cavities. Both leak now; and is it any wonder? The young woman is capable of opening her mouth forty-three millimeters,—almost two inches,—and readily bites forty pounds with the central incisors; at least, that is what the gnathodynamometer has registered several times. This case hurts. The enamel at the incisal margin was slightly beveled and a little groove cut gingivo-incisally, so as to be sure that all was as safe as possible; and here she is with both leaking. These fillings will be removed and the cavities shaped by a method similar to that advocated by Dr. C. N. Johnson in the January, 1896, *Review*. I have filled my last cavity of that kind by the old principles. For eighteen months the Johnson principles have been followed, and I am well satisfied. I desire to say that the same principles govern

similar cavities in the lateral incisors, and many cuspids also. I do not know if this has been advised; but it should have been. You will find some cavities showing the step anchorage among Dr. Johnson's cavities, and four I have prepared. Dr. George H. Cushing, of Chicago, taught me this method some two years ago. One of my cavities is prepared by the Cushing method, the other three by my own. Dr. Johnson's case has not reached me (January 21). He writes it will be ready when I reach Chicago. I am not familiar with his method, and what I know of it was gained by reading his article.

Fig. 2.

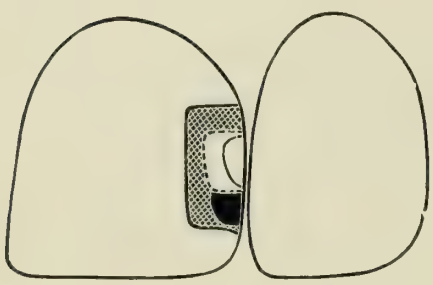
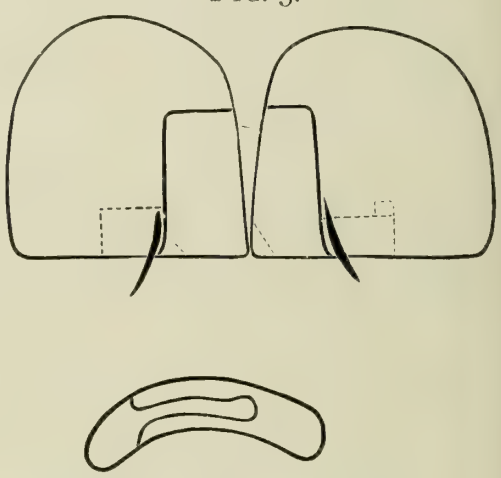
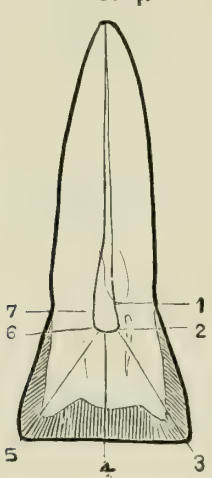


Fig. 3.



Sectional View of Fig. 3.

Fig. 4.



Upper Left First Bicuspid. Buccal Aspect.

Dimensions.

1	1.8½ mm.	5	4.4 mm.
2	2.3½ "	6	2.2½ "
3	4.0½ "	7	1.7½ "
4	4.1 "		

The shape of the mesial cavities in the central incisors I have avoided speaking of, for the reason that there exists too little difference of opinion among scientific men as to what constitutes ideal cavities in these teeth. Dr. Black has, in a series of articles in the Dental Cosmos of 1891, given us his ideas on this subject. These are ideal. The principles advocated may not be carefully

considered by many dentists of the present, but they will be studied more and more in the future. The dental profession owes this deep and scientific thinker a debt it can never pay, and I desire here and now to say that if we had a few more such willing workers in our ranks it would be far better for us. We cannot all be the deepest thinker of the present age, but we can do our quota of all the work left undone.

In measuring the mesial cavities in the central incisors, the length, gingival width, and the thickness of the tooth are first obtained. The cavity is then measured as to length, width at gingival, and the width of the seat. Anything out of the line of the ordinary is noted on the record.

Now as regards the approximal cavities in the first and second bicuspids and first molar, the same principles governing the central incisors hold good. It is supposed, in the great mass of cases, that every one so shapes these cavities that the anchorage will be at right angles to the approximal wall,—an occlusal anchorage. Let it be understood that the old method of linguo-buccal anchorages is not condemned *in toto*. In the past many careful operators have anchored fillings by this method, many of which have by their records stood the test of time. In the light, however, of recent investigation into the subject of masticating stress in relation to the seating area of fillings, it is confidently believed that there is a better and safer method than the one so long in vogue.

There are four things your attention is called to as regards these cavities:

First. The outline drawings of these three teeth.

Second. The lingual margin of the approximal cavities in these teeth.

Third. The shape of the step; and

Fourth. The measurement of the cavities.

The outline drawings of these teeth will be first considered. Let us look at the buccal aspect of this upper first bicuspid. Its length, width, thickness, and all that it has been necessary to measure ere it was filled, is given here. (Fig. 5.) The same has been done with the second bicuspid and molar. The measurements when these teeth were reduced by filing them are given also. The time of the society will not be taken up by reading them; those that desire can look them over at any time.

If the lingual portion of any approximal cavity is extended a short distance beyond the contact of the adjoining tooth, especially in mesial cavities, so that on looking from the lingual at the prepared cavity the entire length of the margin is visible from the median line, any filling placed within the walls of that cavity is much more easily polished, and the chances for a more perfect polish are greatly enhanced.

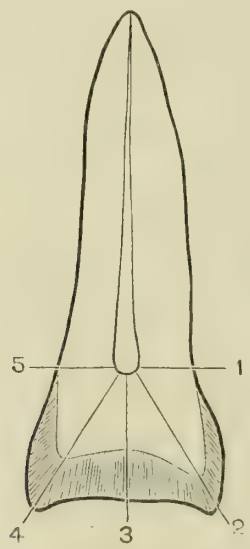
The most difficult place to polish in any approximal filling is the gingivo-lingual portion. By extending the lingual margin this is reduced to a minimum and the tooth not weakened.

If approximal fillings are anchored occlusally, and if the fillings

are to receive much and severe stress from the occluding tooth, the shape of the step is of vital importance.

Some of my patients have strong muscles. The gnatho-dynamometer registers from two hundred to three hundred

FIG. 5.

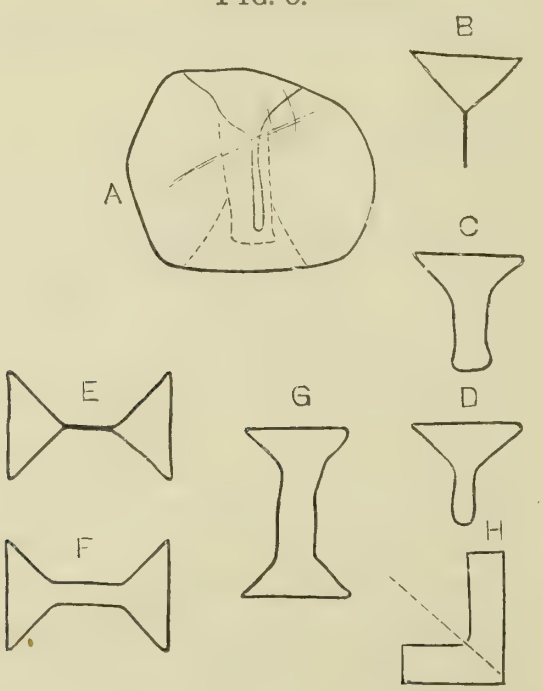


UPPER LEFT SECOND BICUSPID.

DIMENSIONS.

1	2.0½ mm.	4	5.7 mm.
2	5.6 "	5	2.2½ "
3	5.0 "		

FIG. 6.



pounds that the patients bite with these teeth. Several approximal fillings have broken at the line marked in "A," Fig. 6, so that for a year the entire shape or form of the step has been changed. "D" was the shape of the first step and occlusal portion of the filling. "C" is what has been adopted in its place. It is much

stronger, and the form such as to add much more support for the approximal filling than either "B" or "D."

"E," "F," and "G" are merely illustrations of the same form of step, with the exception that it is used in mesio-disto-occlusal cavities. You can readily see which is the strongest. In a word, if the filling on the approximal surface is to receive support from the filling on the step and the anchorage is to be in the occlusal surface, then it is necessary that the step be so shaped that any filling placed on it will be as strong as possible, and the junction of the step with the approximal cavity be as broad as the conditions will admit without weakening the tooth.

"H" illustrates a sectional view of an approximal filling. It is well to have the angle of the cavity rounded so that the filling will have that form at the point marked.

Fig. 7 tells its own story of correct and incorrect preparation of the approximal form of these cavities.

FIG. 7.



In the measurement of these cavities, the length, gingival width, and the thickness of the tooth are first obtained. The same method that was applied to the measurement of the incisors was adopted for the bicuspids, except that in measuring the thickness (linguo-buccally) the first measurement is taken at the gum line, the second midway between the occlusal and gingival (the thickest part of the tooth); the length of the molar is measured from the gum line to the end of the mesio-buccal cusp. The gingival and occlusal width (linguo-buccally) of the cavity is next obtained; the length mesio-distally of the step, its width linguo-buccally. The width of the seat is obtained from the axial angle to the margin of the cavity. The length of the inside of the cavity from the seat to the extremity of the occluso-buccal enamel apico-occlusally (in the molars to the end of the cavity at the mesio-buccal cusp); the depth of the step from the occluso-buccal enamel (apico-occlusally); and if the anchorage is broader and deeper than the step, these measurements are also taken. The records

of the measurements of these cavities were brought with me, and if any desire, they will gladly be given.

The last of these cavities is an occlusal cavity, with the fissures cut out, in a lower first molar (Fig. 8). An ideal cavity of this kind should have perpendicular walls and the enamel-margin slightly beveled. Overhanging walls of unsupported enamel are under no consideration desirable, and should be cut away. The floor of the cavity should be perfectly flat; three or four steps at different depths are not necessary in these cavities that have four good walls around them.

A filling at all times is stronger and rests better on a flat seat. In other words, let us look at the outline of the section of this

FIG. 8.

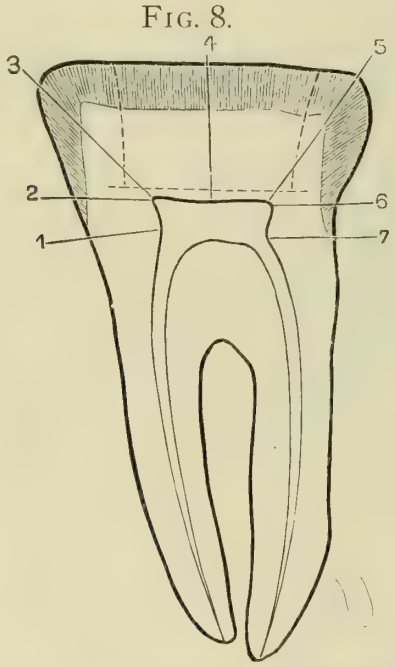
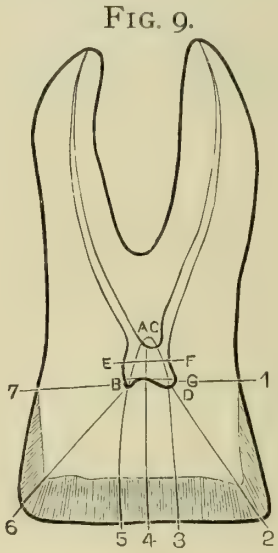


FIG. 9.



LOWER LEFT FIRST MOLAR. BUCCAL ASPECT.

DIMENSIONS.

1	2.4	mm.	5	6.6	mm.
2	3.0	"	6	3.7	"
3	6.1	"	7	3.0	"
4	4.3	"			

UPPER RIGHT FIRST MOLAR. BUCCAL ASPECT.

DIMENSIONS.

1	2.3½	mm.	5	5.2	mm.
2	6.0½	"	6	5.4	"
3	4.6	"	7	2.7	"
4	5.0	"			

molar for a moment. You can readily see how far the pulp lies from the occlusal surface. The measurements tell their own story. It is just as easy for one to so shape the floor of these cavities that they will be flat as it is to have them round. The old cry that by doing so you are liable to encroach on the pulp is in the majority of cases mere fallacy. I should be very much pleased to continue on this subject, but these things you have had from the eminent men who have long since written on the "seating of fillings."

In measuring these cavities, the tooth is first measured. The length of the enamel is taken from the gum line to the end of the mesio-buccal cusp, the width of the tooth at the gingival (mesio-distally), and the thickness (linguo-buccally) at the gingival and occlusal. The cavity is then measured mesio-distally to obtain the length; the width is measured at the distal, at the lingual and buccal grooves, and at the mesial. The depth is measured (apico-occlusally) from the occluso-buccal enamel at the distal, buccal groove, and mesial. This gives a record that may be useful in the future, either for identification and comparison, or should trouble ever ensue, such as the pulp's dying.

The page in my record of measurements that interests me most is the one that contains the measurements of the occlusal cavities. There are no two alike, but they are so nearly so that it is almost one record, as far as the length of the cavity (mesio-distally) is concerned. Thus far it has varied but 1.6 millimeters. There are not such slight differences, however, in the width, and the depth also shows quite a range.

Your attention is particularly called to the ideal cavities very kindly made for your inspection. They are so arranged that you can easily see the difference in the preparation, etc. Your attention is also called to the table of measurements of all the cavities. (See page 390.)

It was not my object to speak of the mode of preparation, the instruments used, or the cavities; merely to touch lightly on them. It is known that our best practitioners remove all soft decay from cavities ere they are filled, and it is most greatly to be deplored that we have men in our ranks who long since have outlived their usefulness, going around the country advising men much younger than themselves "to leave as much soft decay under their fillings as possible, as the enhoused microbes cannot do any harm." Of such I have but this to say: Advice of this kind calls for the righteous wrath of every practitioner who has the welfare of the people whom he serves at heart. There is no reference made here to discolored dentin; that is not dealt with.

Let us stop for a few moments and make some comparisons. How do we, as a profession, compare with other professions,—say the physicians, surgeons, and lawyers? Can there be a comparison made? Dare we make one? Let us look at the practice of medicine. Do not our skilled physicians in the West practice their profession as do yours in the East? Do they treat typhoid fever, measles, or malarial fever in any manner different from that used in the East?

When a laparotomy, a tracheotomy, or a resection of the elbow is made, does any one mean to say that your well-known men perform these operations by any other than the established methods which govern the surgeons of the West? But it is said, "Physicians and surgeons deal with life, and one slip of the knife by a surgeon or an overdose of some powerful medicine by a physician may mean the loss of life. This cannot happen to us; the loss of a tooth makes little difference." I hold *it does* make a very great

Average, Largest, and Smallest Sizes of a Series of Five Cavities prepared by Ten Different Dentists.

Tooth and Cavity. (Millimeters used for measuring.)	Seat.	Linguo-buccally at Gingival.	Linguo-buccally (incisally) at Occlusal.	Gingivo-incisally (Incisors).	Length of Step Mesio-distally.	Width of Step Linguo-Buccally.	Width of Anchorage Linguo-buccally.	Depth or Length of Cavity Gingivo-occlusally.	Depth of Step.	Depth of Anchorage (occlusal).	Length of Cavity Mesio-distally.	Width at Distal.	Width at Grooves.	Width at Mesial.	Depth at Distal.	Depth at Buccal Groove.	Depth at Mesial.	Amount of Enamel left below Cavity Gingivally.
Central Incisor, Mesial.											Width of enamel left between gingival margin and cementum (Above cavity)			Average				.95
Average	1.3	2.7½		3.7½										Largest				1.5
Largest	1.6	4.3		6.7										Smallest				.75
Smallest	1.0	1.3		1.6½							Width of enamel left between incisal margin and incisal edge (Below cavity)			Average				2.55
														Largest				5.05
														Smallest				1.8
First Bicuspid, Mesio-occlusal.																		2.2
Average	1.8	3.1	3.3		2.7	1.5	1.6	4.0	1.7	2.3								2.8
Largest	2.6	5.6	5.4		3.1	2.5	2.7	7.5	2.6	4.9								1.0½
Smallest	1.4	8½	.9		2.0	.8	.7½	2.1	1.0	.9								
Second Bicuspid, Disto-occlusal.																		1.6
Average	1.8	3.9	3.9		2.6	1.8	2.0	4.4	2.0	2.1								2.5
Largest	2.6	5.0	6.2		3.4	2.9	2.5	6.7	2.5	3.0								.5½
Smallest	1.3	3.0	2.1½		1.3	1.2	1.1	2.5	1.3	.9								
First Molar, Mesio-occlusal.																		1.4
Average	1.9	4.5	4.7		3.2	2.1	2.9	4.4	2.2	1.9								3.0
Largest	2.6	7.2½	7.6		4.9	2.9½	3.7	5.2	3.6	3.5								.5
Smallest	1.5	1.5½	1.7½		2.0½	1.3	1.6	3.2	1.4	.7								
Lower Molar, Occlusal.																		
Average											6.7	2.1	5.1	2.0½	2.3	3.0	2.2	
Largest											7.5	2.7½	5.9½	3.5½	4.0	4.7	4.2	
Smallest											5.9	.7	3.0½	.7	1.1	1.4	1.4	

difference. Our pride in our work should be as great as that of the members of any other profession.

Let us consider the lawyers. Our lawyers meet yours in different courts. Do not one and all have well-established rules of practice that are adhered to? I am credibly informed that this is so.

The practice of medicine, surgery, or law is not a series of individual habits, each one for himself, without a guide or without standard principles. Such is not the case. There is a scientific foundation on which they rest that cannot be shaken. We have many learned men who have investigated as thoroughly and delved as deeply and written as much for our instruction as have the men in other professions. Why the scientific principles they have brought to our notice have not long since resulted in a science of dentistry surpasses my understanding. If there ever was an occasion for standard works, more especially on operative dentistry,—something that is an authority in the East, West, North, and South,—it is now, and I hope the day is not far distant when we shall have it.

Gold and Tin as Tooth-Filling Materials.

BY T. D. SHUMWAY, PLYMOUTH, MASS.

(Read before the First District Dental Society of the State of New York, February 9, 1897.)

The title of this paper would indicate a consideration of the relative value of gold and tin as tooth-filling materials along very narrow lines. The use of these two metals in filling teeth is neither new nor novel. The merits of each have been many times before dental societies for discussion. It may be said that a subject so hackneyed can have but little interest to the average practitioner, and we would not at this time introduce it again to your attention were it not for the purpose of presenting it in a somewhat different manner from that in which it has usually been treated. In connection with this we have to present other matter to which we believe these metals bear a very important relation. What we have to offer is not submitted in the capacity of a teacher, but only that we may draw a practical lesson from the teachings of those who have made the teeth a subject of scientific inquiry. This we do with diffidence, prompted by a consciousness that the position we are led to assume will conflict with the methods of practice which have been in common use for more than thirty years, and which have received the indorsement of those who have occupied positions of commanding influence and importance in the profession.

Before discussing filling-materials, it is necessary to inquire what a tooth is, how it is constructed, and how nourished and supported. What facts has scientific investigation revealed concerning this wonderful piece of mechanism? In the investigations of those who have inquired into the structure of the teeth, this fact is made clear: that these organs, although apparently so solid and dense, do not differ greatly from the other organs of the body; the pro-

cesses of waste and repair differ only in degree, and not in kind in the whole economy.

When the human body is submitted to the crematory process, what is the residue? Only a handful of ashes; the rest has been evaporated as water or dissipated as gases. Water and gases, it is said, make up at least ninety-five per cent. of the whole organism. From the recent experiments of Dr. Black, we learn that the dentin contains nearly forty per cent. of organic matter and water, not to mention the pulp. The only part of the teeth that seems to be void of organic matter is the outer covering of the enamel, certainly a very inconsiderable portion of the whole tooth-structure.

That the matter, of which this paper is intended to treat, may be the better understood, we desire to quote from those who have made a special study of the teeth, both physiologically and microscopically. In these quotations, while they may not all agree as to the minute structure of the teeth, it will be noted that they all do agree that the internal arrangement is a living vital organism.

In the *Dental News Letter*, published in 1852, Professor Elisha Townsend, in a paper entitled "Speculations upon Inflammation of Dentin or Tooth-bone," said, "Now it is known as a general law of living organism, that the special function of a part is seated in the extremities. In the arteries, all the actions of nutrition are certainly performed at the ultimate points of the minutest vessels. Again in the reparation of parts destroyed by ulceration, or external violence, the granulations are produced from extremities of the vessels, for they are deposited upon the surface of the wound. The blush upon the cheek, and every instance of efflorescence, however induced, are clear examples of action in the capillaries independent of and in the absence of all excitement in the general circulation. This shows an independent compatibility of action in the radical tubes, and sustains the assertion that the vitality of vessels is eminently in their extremities. The larger branches are only so many conduits, or conveyors of the vital fluid, and are not, as they need not be, endowed with any greater sensibility or functional activity than such ancillary office demands. Of the nerves, the same thing is true, as in those devoted to the external senses of vision and smell. Here the special power of the nerve is found, not at all in the trunk, but in the expanded and ramified extremity. The office of the trunks and branches of considerable size—it may be said of all sizes which are easily exhibited by dissection—is merely that of conveying impressions from the extremities, where they are received to the brain, and conversely the impulse of the brain outward to the organs of motion. These larger branches and their common stems are not only destitute of the special functions belonging to their extremest fibrillæ, but they have very little, if anything, more than the common sensibility to violence and irritancy that belongs to all the soft parts of the body. The teeth are under the same law. When disease invades them, which tends to their destruction, pain is felt, not only in the deep-seated pulp, but at the very surface of the dentin, as near the exposed surface of the tooth as the enamel permits."

Dr. L. C. Ingersoll, in a paper entitled "Histological Methods and Results," published in the *International Dental Journal* of November, 1891, says, "We reason from function that there is a circulatory system in dentin. We do not ask the microscope to define and map it out to the eye before we believe it. We know it in advance of observation. We know by that instrument, the primary fact, that there is a condensation of peripheral dentin; that the tubules of the dentin are filled up, late in life, with lime-salts at their outermost extremities, and from this primal fact we make the logical deduction that there must be a circulatory system through which the lime-salts are carried."

Again he says, "I think there is no question in the mind of any reading dentist that, however well filled the central cavity of a tooth may be with blood-vessels, myxomatous matter, connective tissue, odontoblasts, and other tissue-cells, there are also nerves and nerve-fibers ramifying the mass in all directions." This from the physiological standpoint.

In the DENTAL COSMOS of 1878 and 1879, Dr. C. F. W. Bödecker writes: "The dentinal canaliculi are excavations in the basis-substance of the dentin, each containing in its center a fiber of living matter. Besides the dentinal canaliculi, there exists a supremely delicate net-work within the basis-substance of the dentin into which innumerable offshoots of the dentinal fibers pass. Although we cannot trace the living matter throughout the whole net-work of the basis-substance, we are justified in assuming that not only the dentinal canaliculi, but the whole basis-substance of the dentin is also pierced by a delicate net-work of living matter."

Dr. W. H. Atkinson, in a paper read before the American Medical Association, in June, 1889, said, "Dentin has no cells, but is possessed of a firm basis-substance (not cartilaginous, as formerly thought, but glue-yielding) thoroughly infiltrated with lime-salts. This basis-substance is traversed by canaliculi which radiate from the surface, occluding the pulp-chamber, and outward to join the cement and enamel. Each canaliculus holds in it a delicate fiber, called the Tomes fiber, around which exists a minute space filled with a liquid, obviously the carrier of nutrient and denutrient substances. Fine thorn-like offshoots were known, especially in transverse sections of the dentin, to emanate from the fibril, traverse the surrounding space, and fade upon approaching the wall of the canaliculi. Now, in the light of the bioplasson theory, the Tomes fibers are formations of living matter." This from a microscopical examination.

These quotations are made simply for the purpose of calling attention to and emphasizing facts that to-day are well recognized and understood by every observant thoughtful dentist. They are produced to give strength to the statement that a tooth is a vital structure, nourished and supported in the same way as all the other organs of the body.

With these facts then admitted by all, the question is: What treatment should the teeth receive at the hands of the intelligent dentist? What is the underlying principle to govern in the method

employed to arrest and prevent decay? If the physiologist and the microscopist agree as to structure and function, it would seem that there might be a basic or fundamental principle to determine the method of operation, and the selection of tooth-stopping material. To have a scientific method of treatment, certainly there must be a recognition of what is known of the nature of tooth-structure. The method adopted more than a quarter of a century ago, and which is at present employed, does not accord with the teachings of the physiologist and the microscopist; it is in direct opposition to natural law. Each new discovery in the minute structure of the teeth makes this more plain; pounding the teeth with a mallet cannot be defended on scientific grounds. That it has not resulted more disastrously is due to the wonderful recuperative energy of Nature to repair injury. No one would think of attempting to arrest and prevent disintegration in any other vital organ by abrasion. Why then, in operations upon the teeth, should we reverse the plain simple teaching of Nature? It is true that in operations upon the teeth the practitioner has to deal more largely with conditions than with causes. In this busy world, with so many demands upon our time, we cannot stop to indulge in fine-spun theories.

It is with conditions, growing out of failure to secure permanent results, that have occasioned the preparation of this paper upon the subject of these two metals as filling-materials. The principal cause of decay it is not our purpose to discuss. We neither indorse nor attempt to controvert the "germ theory." For our present purpose, we are prepared to admit that the "germ theory" is well established. But there are conditions of decay where teeth have been filled, which have come under the observation of every dentist, that seem to be the result of causes outside of and independent of this theory. These conditions, Dr. S. B. Palmer says, are the result of electro-chemical action. This he termed secondary decay. The contention of Dr. Palmer is not inconsistent with, but only supplementary to the "germ theory." Whether secondary decay can or cannot be attributed to electro-chemical action, one thing is certain: pounding with a mallet a living organism, is not in harmony with natural law. No one would think of pounding pebble-stones into a tree where the bark had been wounded, and expect, by that process, to heal the wound. This leads us to a consideration of filling-materials, and the manner of introduction to obtain permanent results.

Much has been said and written in regard to the incompatibility of gold as a filling-material. Professor Flagg has declared that in proportion as teeth need to be saved, gold is the most dangerous material to use. Others have said that gold is the only substance that is suitable for permanent work, that it is the sheet anchor of the dental profession. Again, Professor Flagg says that gutta-percha is the best material for permanent stopping, and that any of the so-called baser materials are to be preferred to gold.

The reasons for these differing statements have not been made plain. In order to show that one material is the most suitable,

and another the most dangerous, it is necessary to inquire into the physical structure of the filling after it is introduced. The statement that gold is the most dangerous material to use if the teeth are to be saved, is altogether too sweeping. A distinction must be made as to the condition of the gold when used. Neither will it do to say that gold without qualification is the only suitable substance to employ. Every dentist knows that gold in the non-cohesive form is not a dangerous tooth-stopping. It is also true that gold in the cohesive condition may not only be dangerous, but positively destructive, when placed in the teeth in the form of a plug.

We know of teeth filled with gold that have done continuous service for forty years, and the teeth and fillings are in as perfect a condition to-day as the day they were put in. These fillings were made by the late Dr. Joshua Tucker, of Boston, and were of gold in the non-cohesive form. Gold in this form is one of the least dangerous filling-materials that we have. This is because of its structureless character; that is, it has been beaten into thin sheets, and its crystalline character destroyed. It is only when it has been heated after beating, and the crystals liberated, that gold becomes dangerous.

Many years ago, the writer, in conversation with Dr. Tucker, asked him the reason for his success as an operator, and why he was able to maintain a reputation for gold fillings for so long a time. His answer was that he had always avoided gold that was "sticky," as he termed it,—that is, gold in the least cohesive. Dr. Tucker demonstrated that teeth could be filled with gold and saved, but the objection to this method was that his practice was limited by reason of its non-cohesive property. Only teeth favorably situated with good strong walls can be successfully filled with non-cohesive gold. Dr. Tucker reasoned that it was better to save twenty teeth than it was to try to preserve them all, and not succeed in saving more than six. It was his practice to extract the first permanent molars, and, frequently, the second bicuspids, that he might preserve the remainder. Numerous cases of this kind have come under our personal observation. Dr. Tucker built up a splendid practice, added dignity to a profession, and elevated the standard of dentistry in New England by the use of gold in filling teeth. This he could not have done had it been dangerous or objectionable.

When cohesive gold was introduced to the profession, while it was softer than the non-cohesive foil, it was found to resist under manipulation. This resistance is in accordance with the well-known law that all crystalline bodies, when unobstructed, run into symmetrical forms, or assume a definite shape. With gold the tendency is to a spherical form. Now, the process of crystallization is always from within outward. A barrel of water if left to freeze will always bulge up in the center. This resistance on the part of cohesive gold caused the use of it to be abandoned shortly after its first introduction. It was not until some years after that the use of this form of gold was revived, and then it was by the in-

troduction of the mallet to overcome the resistance caused by the development of the cohesive property. This is where an analysis of the physical structure of a filling becomes important. Pounding gold with a mallet only increases crystallization. When a cohesive gold filling is put in by malleting, no matter how completely the contour may be restored, we have a purely crystalline body.

As we have already seen, the dentin is a living structure made up of forty per cent. of organic matter and water. A crystalline body coming in contact with a fibrous one can neither be antiseptic nor preservative. Is it any wonder that we have heard so much of the incompatibility of gold? Would not this invite secondary decay, and furnish a sufficient basis for the electro-chemical theory of Dr. Palmer?

If we would have a filling-material which is antiseptic or preservative, it must be one that corresponds or is in harmony with tooth-substance, a filling which does not depend entirely upon the mechanical construction of the cavity for its retention. A filling cannot be made of cohesive gold which does not depend wholly upon the shape of the cavity to hold it; it must either be anchored, dovetailed, or undercut. This shows that it is a foreign body that Nature would expel if permitted. There is a substance in the interglobular space which Wedl called amorphous, or structureless substance. A filling to be in harmony with this substance should be amorphous or structureless in its composition. The only materials we have which meet these conditions are gutta-percha and tin.

All are familiar with the use of gutta-percha, and know its limitations. One of the most objectionable features is the tendency to be affected by the fluids of the mouth, and to lose its integrity or cohesion. Added to this is its softness, which excludes it from being used except for temporary stopping.

Tin has long been recognized as one of the best filling-materials. The older members of the profession remember how it was used as a temporary stopping to harden the teeth. It is its structureless character that gives to tin its value. Coming in contact with the living dentin, it is easily adapted to its position, and does not excite inflammation, as it is in harmony with the amorphous substance mentioned by Wedl. It does not interfere with the process going on within the teeth to heal the lesion caused by decay. This is what is called hardening the teeth.

The same process of restoration goes on within the teeth under favorable conditions as takes place in any other part of the body when similarly affected. A wound from a bullet made of tin, unless it struck a vital part, Nature would heal, even if the cause of the wound were not removed, by encysting the ball. This process of Nature of repairing injury by encysting the cause, is of interest to the dentist in the study of suitable filling-material; it is a beautiful illustration of the law of correspondence.

A physician, a friend of the writer, related his experience during the first year of his practice while in the army. A soldier had a bullet in his arm which had been there for two years. The doctor

said it looked like a very simple thing to take it out, as the ball had come very near the surface of the skin. He cut across it without any difficulty, and thought it would slip right out, but to his surprise, he found that before the ball could be removed, it had to be dissected entirely away. The patient had suffered no pain, and but little inconvenience, since first the wound had healed. It was the amorphous or structureless character of the lead that made it possible for the bullet to remain without injury. If the soldier had been shot with a gold bullet he would have suffered from inflammation and suppuration, unless it were quickly removed.

One of the most serious difficulties the dentist has to meet is decay at the cervical margin after the teeth have been filled. Various theories have been advanced and reasons given for this failure on the part of the filling. Some have said it was the result of carelessness on the part of the operator; others because the fillings were not contoured so that they would knuckle together at the top, and leave self-cleansing spaces at the cervical margin; still others that it is because gold was used, without making any distinction as to the kind of gold. There are also those who have found the same difficulty with amalgam, who attribute it to the alloy.

Now, if those who have made a special study of the teeth are to be believed, we have not far to seek for the real cause of failure. If a filling has been inserted that is crystalline in its composition, it does not correspond, but is out of harmony with the internal structure of the teeth. It is taking up or absorbing the amorphous substance that should go to repair the lesion. Any mechanical structure will fail at its weakest point. In a large majority of cases where teeth are filled approximally, the base of the cavity is below the enamel line. If Nature is obstructed by a foreign body which it refuses to tolerate, its greatest energy will be exerted at the weakest point, and this is where the filling joins the dentin. Those who have had occasion to remove cohesive gold or amalgam fillings, are familiar with the peculiar odor that almost always attends their removal. This odor must be the result of decomposed amorphous substance. A filling made up of crystals or grains acts like a sponge to absorb the nutrient matter.

A structureless filling like tin is in harmony with Nature. When placed against the dentinal walls, it does not interfere or obstruct the process of repair going on within. Acting as an antiseptic or preservative, it reduces the liability to subsequent decay. But tin as a filling-material has its limitations. In the first place it is affected by the fluids of the mouth. Oxidation takes place on the surface, and, in most mouths, it becomes black and unsightly. Again, it is soft, and yields readily under pressure. This in exposed places causes the filling to wear away rapidly. While this perhaps may be the least objectionable feature, it militates against its use as a permanent tooth-stopping. Again, it cannot be used for contour work, or to restore lost parts. It should be borne in mind that in the discussion of gold and tin as filling-materials, it is our endeavor to find out how to obtain a stopping that will pre-

serve the teeth, and reduce the liability to, if not wholly prevent, secondary decay. A filling that remains intact, while the tooth dissolves away, is worse than no filling at all. The law of correspondence is of much more consequence than the mechanical construction of the plug. Tin can be used without that rigid adherence to mechanical rule that is necessary to retain a plug of cohesive gold. Undercuts, dovetails, or retaining pits are not essential in the use of tin, as they are with gold in the cohesive form. For this reason, less of the tooth-substance needs to be sacrificed. By retaining a larger portion of the tooth, there is less danger of breakage.

Now, gold will unite with tin under certain conditions so as to form apparently a solid mass. By a combination of these two metals, not by interlacing or incorporating one into the other, but by affinity, secured by simple contact, we have all the preservative qualities of tin combined with the indestructible properties of gold. None of the objections which have been urged against gold alone will apply to this method of operating. For the base of the filling we have a material in harmony with tooth-substance, introduced in a way that is in accord with the law that governs all living bodies, and for the outside, a crystalline substance that corresponds to the enamel covering of the teeth. This covering, not being affected by the action of the fluids of the mouth, is a perfect shield or protection to the base or internal structure. No limitation is put upon this practice, as the field for the display of artistic skill in the way of restoration of contours is as broad as though gold was used in the entire operation. But will a filling of this character withstand the force which the jaws are able to exert?

The amount of resistance which a filling should sustain has been made the subject of much inquiry and investigation. With a view to determine how much force a filling will bear, the dentin has been subjected to a crushing stress. Hardness has been considered an indispensable requisite in a filling. One of the first questions asked is, Will the filling stand the force of mastication? While the human jaw is able to exert a force equal to two or three hundred pounds, the conclusion is that a filling, to be permanent, must be capable of withstanding an enormous pressure. No such consideration is deemed necessary in the other operations in the mouth, particularly in the construction of artificial teeth, either in partial dentures or whole sets. If it were thought to be necessary that an artificial denture should be able to withstand a force of three hundred pounds, very few of them would be constructed. In the construction of crown- and bridge-work, it is deemed practicable to support a bridge by two opposite teeth. No one would be deterred from filling pulpless teeth because the jaw is capable of a crushing stress equal to two hundred pounds. We have seen and extracted pivot teeth that were inserted upon wooden pivots made of hickory that had done continuous service for thirty-five years. We have patients with pulpless teeth that have withstood the force of mastication for a quarter of a century. There is in the economy of Nature a provision made to overcome the resistance

of occlusion. The teeth are cushioned in the jaw, and yield under pressure.

The elasticity of the substance of which teeth are made is well understood. Ivory is the most elastic substance known. This is why billiard balls are made from it. The teeth coming together is like the percussion of two ivory billiard balls. Now, a filling to save the teeth should correspond as nearly as possible with the tooth-substance. It should not be arbitrary, but elastic and yielding. One who has had much experience in operative dentistry made the remark, some years ago, to the writer that he was surprised to see how little hold was really necessary in a filling to be retained in the teeth. A filling to preserve the teeth, while it should be able to resist the force required in mastication, yet being mechanical in its structure, there can be no objection to its gradually wearing away. Intelligent patients would not complain of this if they were assured that the filling was wearing, and not the tooth being destroyed by a material not in harmony with its structure.

The advocates for the use of amalgam have based their claims largely upon its power of resistance. Now, the same objection can be made against amalgam that is used against cohesive gold. The physical structure of the filling renders it dangerous to tooth-substance. Its granular character makes it easy for it to absorb the amorphous substances that should go to nourish the tooth. The fact that it does not wear is one of the reasons why it should not be used.

In Harris's "Principles and Practice," we read, "Amalgam is the most pernicious material that has ever been employed for filling teeth. It almost always oxidizes in the mouth, blackens, and often hastens their destruction. When used in considerable quantity, it exerts a deleterious effect upon the alveolo-dental membranous organs and other parts of the mouth."

That the mercury exerts a deleterious effect upon the whole system, is believed by a large and influential body of medical practitioners, who have entered a strong protest against its use. This body of men the dental profession cannot afford to ignore. When dentists buy alloy by the pound, as a president of one of the leading dental societies recently told the writer he did, what an astonishing amount of mercury the people must be carrying around in their mouths! Perfect dental alloys as we may, expend all the energy possible to obtain edge-strength, and flatter ourselves that we have a filling that will withstand all the force which the jaw is able to exert, we still have a filling that is out of harmony with tooth-structure, a foreign body which Nature would expel if she could. Recently, we have seen it recommended as good practice to bind an amalgam filling until it hardens. Binding a filling to prevent Nature from expelling it may be good for the filling, but bad practice for the teeth.

Tin is interdigitous, it expands laterally, and is almost as easily introduced as amalgam, and when put in place does not have to be bound to be retained. This, with an outside covering of gold to protect it, makes a filling to which amalgam bears no comparison.

Its power of resistance should have little weight when these qualities are considered.

In the DENTAL COSMOS of 1894, Dr. Henry Burchard, in a paper on "Principles *versus* Empiricism," says, "While there is probably no one who would have the temerity to deny to dentistry the possession of great stores of information, each searching examination of this will demonstrate a paucity of principles. Neither can it be denied that any verified observation has its value; but how much is this value enhanced if it is placed in relation with all kindred facts, and a generalization, perhaps a principle, made of them. A fact is a thing by itself. A principle may embrace a thousand of these elements, and, knowing this, one has a comprehension of that thousand. Principles, in fact, prolong the lives of professional men. While it is necessary that sciences have links, it is more important to have these formed into a circular chain; for given only the links, a chain may never be made, but given the chain, the links are self-evident."

The object of this paper is to gather the links of the chain which have been supplied by different minds, and by the process of generalization, crudely perhaps, evolve a principle which shall apply to one form of lesion in the oral cavity. "Principles," it says, "prolong the lives of professional men." A basic principle governing the operation of filling teeth would at least tend to lighten the burden of the dental practitioner. How many of the geniuses of our profession have had to succumb in their attempt to master cohesive gold! In physics as well as in morals, "the way of the transgressor is hard." Placing cohesive gold against the dentinal walls by pounding it to heal a lesion is opposed to natural law. There is little wonder that those who have developed the greatest skill in this direction, and whose proficiency with the mallet has been the admiration of all the profession, should be prematurely stricken down. Cohesive gold will not be mastered by force. If compelled to yield by superior strength, it seeks a way to release itself. It is easily coaxed, but not willingly driven; it yields readily to its affinity, and is conquered, as the late Dr. Tucker expressed it, by love. The work of the conscientious dentist is, under the most favorable conditions, hard and difficult. He has to operate upon organs so sensitive that every one shrinks from having them touched with an instrument. The work itself is laborious and exhausting. These operations, when performed in opposition to natural law, become a very burden. If we can stimulate the profession to a recognition of the law which governs waste and repair, this paper may be of some service to both dentist and patient.

It has been urged that only those oppose the use of cohesive gold and the mallet who have not been able to use them successfully. It is said that cohesive gold fillings do not fail if they are skillfully introduced. If they are contoured and knuckled together with self-cleansing spaces at the cervical margin, there is no secondary decay. It is a little singular that most of those possessed with so much skill with the mallet were among the first who caught on to crown- and bridge-work. It looks very much as

though crown- and bridge-work was what saved them from a damaged reputation. We know that among those who have had teeth filled with cohesive gold and the mallet, the testimony is general that it has not been satisfactory. What a procession the wrecks by cohesive gold in the past twenty-five years would make!

It is not our purpose to provoke controversy, at the same time we invite criticism. If there is any controversy, it must be with those who have established the facts relative to the internal structure of the teeth. If those who have reasoned from function have only indulged in idle fancy, and the investigators with the microscope have seen with a distorted vision, we may be justified in assuming that the teeth are inanimate pegs stuck in holes in the jaw, and that the law which governs vital organs does not apply. The physiologist and microscopist, one reasoning from function by the process of deduction, and the other by an aided vision, investigating the minutest structure of the dentin by the process of induction, agree as to the physical character of the teeth. The conclusion is that a tooth is an organ pregnant with life, with power, if not interfered with or obstructed, to protect, if not repair a lesion. This very plain teaching the dentist cannot afford to ignore.

It is said that there are many methods of practice, and that each has its advocates and adherents. Some are successful with one method, while others are successful with another. Most of the announcements of our dental schools contain the information that the various methods are taught. Now in the light of scientific investigation, there can be but one method,—a method based upon the recognized principle that the filling-material and the manner of introducing it shall correspond to and be in harmony with the living vital organism with which it comes in contact.

Again, it is urged that this is too idealistic; it may do for a dreamer, but the conditions necessary for success are both too delicate and exacting to meet the needs of every-day practice. Did it ever occur to those who make this objection that pounding cohesive gold into the teeth only substitutes mechanical union for cohesion? This is treating the teeth as though they were inanimate objects, and ignores the fundamental principle which, as we have seen, is essential to prevent failure. If there is anything that requires delicacy and exactness in manipulation, it is operations upon the teeth with cohesive gold. It may be possible for practical results to follow from what may be termed ideal teaching. Art should play an important part even with the practical dentist. The question, and we confess a very potent one, has been asked if the application of this principle in practice without modification has been satisfactory. To this we have been obliged to answer in the negative. While we were aware that the modifications were contrary to natural law, they have been necessary to meet the exactions of those who view a filling purely from its mechanical construction.

After twenty years of experience we have to admit that the union of cohesive gold with non-cohesive, by simple contact, has been only partially successful. The affinity is apparently lost, and no

amount of coaxing will restore it except partially. For this reason the filling would part at the point where the cohesive gold was joined to the non-cohesive. The modification consists in using cohesive gold instead of non-cohesive for the base of the filling, and this has to be introduced with a force sufficient to secure a lodgment in the undercut, or dovetail, or by starting from a retaining pit. This was found to be necessary in order to get a laminated surface of gold that would not scale off.

It was not until we learned by experiment that cohesive gold would unite with tin at an insensible distance, just as cohesive gold unites with itself, that the principle could be applied successfully. This union takes place without force or pressure. When we learned that cohesive gold had an affinity for tin which it did not have for gold in the non-cohesive form, the problem seemed to be solved. The many years of experiment had not been lost, however, for we could not have known without long waiting what the result would be. Now we speak with the confidence which long experience gives. The union of these two metals is indeed astonishing. Exactly what takes place when gold and tin are brought in contact in the way described, we do not know; we can only say that there appears to be a perfect union, and we know that it is in harmony with Nature, and finds its correlative in that higher law of physical science which our faculties permit us only to perceive.

We are aware of the imperfect manner in which this subject has been presented. In the process of generalization to find out the underlying principle, with so many facts from which to draw, it is difficult to sift out those which are the most important. Much that might have been said that perhaps would have had more weight has been omitted. As we said at the beginning, it is not as a teacher, but as a learner that we have endeavored from the teachings of those who have made a special study of structure and function to draw a practical lesson: a lesson, we trust, that shall stimulate the profession to the recognition of the basic principle which should govern in the very delicate operation of filling teeth.

PROCEEDINGS OF SOCIETIES.

New York Odontological Society.

A regular meeting of the New York Odontological Society was held on Tuesday evening, January 12, 1897, at the New York Academy of Medicine, 17 West Forty-third street; the president, Dr. William Carr, in the chair.

The President. Gentlemen, it is exceedingly gratifying on this, the thirtieth anniversary of the New York Odontological Society, to welcome to his native land, after an absence of twelve years in London, Dr. Williams, a former co-laborer.

For some years previous to his departure for Europe, Dr. Wil-

liams devoted considerable time to scientific investigations, and these investigations were continued during his twelve years of absence. He is here to-night for the express purpose of presenting, for our consideration, the results of his latest and most important researches. It gives me great pleasure to introduce to you the essayist of the evening—Dr. Williams.

Before reading his paper Dr. WILLIAMS said,—

Mr. President and Gentlemen of the Odontological Society:

I thank you for your cordial greeting. It comes to me as the culmination of many warm expressions of kindness and good will which I have received during the few days I have been among old friends and new.

I can hardly enter upon the consideration of my subject this evening without some reference to a sad event of which I had not heard until I reached New York. I refer to the passing away of Dr. Heitzmann. Eleven years ago when I read a paper before the First District Dental Society, on almost the same subject as I have chosen to-night, Dr. Heitzmann was my chief antagonist. I came here expecting to find him my chief antagonist to-night. But his lips have been touched with the great and silent eloquence of death, and his voice will be heard no more in our deliberations here. The old proverb "*De mortui nil nisi bonum*" has no force with me at this moment, for I not only have no inclination to speak in any other than terms of warmest appreciation of Dr. Heitzmann for his many fine personal qualities, but I wish to do more than that. I wish to say—and it gratifies me to know that I had intended to say this when I contemplated meeting him as opponent—that while I have nothing to retract concerning what I have said about him as an interpreter of certain histological facts, yet I have always been aware that he was familiar with important truths not recognized by many who have criticised him severely. He was one of the first, although not *the* first, as some of his over-enthusiastic but injudicious admirers have claimed, to see that cell-protoplasm was not the simple, structureless substance it had long been thought to be. His great error grew out of an attempt to erect a theory upon the supposition or assumption that this protoplasmic structure was constant and invariable. Later investigation has shown that the cell nucleus often passes through many changes, and also that the structure of the cytoplasm takes on different forms. But whatever his intellectual faults may have been in life, he has now solved the greatest of mysteries, and we may say of him as one of Bret Harte's characters says of another, "He knows more than all of us now."

Dr. WILLIAMS then read his paper, which appears in the DENTAL COSMOS for March and April, and is concluded in this issue.

Discussion.

Professor G. V. BLACK, Jacksonville, Ill. It is exceedingly difficult to undertake to open a discussion upon the paper just heard. Where such a mass of evidence has been given, it would not be

possible for me this evening to go over and touch upon the different items presented. When we think of the work in the technique alone that has been necessary for the production of the views that have been thrown upon the screen this evening, we see that the labor has been simply enormous,—not only enormous in bulk and in amount, for it has required the grinding of a great many more sections than have been shown, in order to obtain those that are shown,—but many of the pictures are a long step in advance of anything that has been shown before. Step by step we move forward, and this evening we have made a very long step. Particularly gratifying to me have been those illustrations of bacteria in position upon the surfaces of the teeth. Do you know how long it has taken to demonstrate that, since it was first pointed out—no, I will not say pointed out, and yet shadowed out? Since 1835, when Robertson said, "Decay is produced by decomposition occurring at the immediate spot where the decay begins," this is the first time that that demonstration has been given to the public, showing these micro-organisms—the agents of this decomposition—exactly in position where the beginning of decay occurs.

Going back a moment from that, to the other illustrations, I want to say a word. To many of you these illustrations are difficult to understand. Dr. Williams has spoken very decidedly of things to be seen that many of you have probably not seen. There is a reason for this. I think I have seen pretty nearly everything he has spoken of. I have been accustomed to following the specimen from the microscope, through the photo-micrograph to the screen. Many of you have not been so well accustomed to the specimen under the lens. The appreciation of these points is a thing that one acquires by long practice, and while Dr. Williams sees what he points out, I know it is difficult for some of you to see and to realize these things. Photographs are shadows, in one sense, and the shadows are there certainly if we know just what to look for. There is a great difficulty that comes in between the microscopist who has labored in this direction and brought out his pictures, and his audience, who looks at the pictures—a difficulty that I appreciate—a difficulty that no doubt Dr. Williams appreciates, and one that stands in the way of the full appreciation of this work by very many who would like to see all that Dr. Williams sees, and all that some special ones among you can see.

Now, gentlemen, what is it that impels a man to leave his practice day after day and go into his den and labor for the production of such a show as this? No; not for the production of such a show as this at all. He never would do it for that. This is only an incident of this study. It is something within the man that impels him to follow thought after thought, seek more and more into Nature's work, into the whys and wherefores of things. This work was begun, we may say, as dentists, by John Tomes, and it has been continued by this one, by that, and by the other until the present time. Only a few have obtained results, but these results have been added to, little by little, until we have our framework now almost completed; yet not complete, for there is a great deal

more to be done. This same impulse to dig into Nature's facts will impel some others to undertake the work and continue the development. What does he get for all this? The satisfaction of having done it; and further, it furnishes us as a profession with the basis of treatment. Maybe you do not all comprehend this as a living fact. When John Tomes began his work, he began it as a vitalist, on the supposition that caries was caused by inflammatory processes. His studies gave us a knowledge of the odontoblast, of the processes known as the "Tomes processes," of the general structure of the dentin and of the enamel, and gradually dispelled from his mind the idea that caries could be from inflammatory processes, and established the basis upon which successful filling of teeth could be done. This has been developed little by little, until now we know that inflammatory action does not occur in dentin, much less in enamel.

There has always been one factor that has caused men to hesitate as to a full and complete acceptance of the non-reaction of the tissues of the teeth to encroachments of caries, or the fact that vital changes do not occur in enamel and dentin on account of injuries by caries or otherwise. This point of hesitation has been based almost exclusively upon the fact that dentin is sensitive,—that it is vital,—a matter that we all realize fully from the complaints of our patients. I cannot help saying a few words about that this evening. I have spoken of it in New York before. I do not believe it has had the attention it deserves, and I speak of it particularly with reference to the demonstrations that have been made here this evening; and in order that you may be able to more fully accept certain things that have been taught here this evening, which I believe are correct and should be accepted fully and completely.

We touch the dentin in certain teeth, and we find the patient flinch. It is sensitive. We all understand that we have different degrees of sensitiveness of the dentin. In explanation of this, I will say that in the study of the dental pulp, I have found that the so-called fibrillæ given off from the cells of the pulp have a different reaction to stains from the fibrillæ of fibrous tissues in general. In the fetal pulp there are no fibrillæ, but as the person grows older we find the pulp-cells have diminished in number apparently, and have become smaller, have become spindle-shaped, or stellar, and we find they have given off fibrillæ, and these fibrillæ ramify all through the basis-substance of the pulp. They do not gather into bundles, except around blood-vessels or the larger nerves. In the pulp they do not interlock with each other and form a tissue. These fibrillæ of the pulp are different from the fibrillæ of the connective-tissue group elsewhere. In the connective-tissue group generally they are gelatin-forming fibrillæ, and do not take stains the same as the fibrillæ we find in the pulp. It is true also of the processes of the odontoblasts that they take stains differently from the tissues of the connective-tissue group elsewhere. Why? They are processes composed of the protoplasmic contents of the cells, and are not gelatin-forming fibrils, but processes. This process is a functioning part of the cell.

Leave that for a moment, and we will come back to it.

If we have a specimen of the amœba upon a microscopic slide, and there is a slight jar or shake, we find it responds immediately. It draws into a rounded mass or gives some movement that shows a response to the stimulant, or to an injury. If we have a white blood-corpuscle, it will do the same thing, showing that protoplasmic cells have an irritability; they are living, and they respond to injuries. I need not follow this out; you understand the proposition.

Let me speak a moment in regard to the muscular cells. Take the striated muscular fibers; they are long. The distribution of nerves to them is very incomplete, apparently. A single nerve-plate may be attached to each individual fiber, not more, and yet notwithstanding its great length the whole fiber responds to stimulus by contraction. Then we pass on to the smooth muscular fibers—the involuntary fibers. These are short and comparatively small. You look in vain to find nerve-plates connected with each muscular fiber, and yet the whole series is brought into contraction by the few plates that are distributed to certain fibers. What does this show? That it is not necessary that every living cell be in direct connection with a nerve, in order that its injuries may be communicated to the brain and registered. With our present knowledge of nerves it is impossible to suppose that every cell in the body is in direct apposition with nerve-fiber; yet we must suppose that every individual cell is able to register its injuries, and crave the protection of the general organism. The processes of the odontoblasts are functioning parts of these cells, and when you touch these processes you have virtually touched the odontoblasts. The odontoblasts being in physiological connection with the nerves, an injury to them is registered, and the protection of the general organism craved on account of that injury. It is not necessary that the dentin take part in this. It is only the processes that pass through the dentin. In 1893 this was demonstrated in another way.

Dr. Carl Röse, of Switzerland, in studying these fibrils, has undertaken to demonstrate the character of these processes in a chemical way. I will state the matter as briefly as possible, and you can go back to the Cosmos and read the translation that has been published. He has taken the pulps from the teeth of a young pig, a young cow, a very old cow, and tissues from the gums of a young pig. He has placed these four in different test-tubes, and putting a few drops of water with each, has placed them in a vulcanizer and raised them to a temperature a little above the boiling point (239° Fahr., I believe), for the purpose of converting all of the gelatin-giving tissues in each into gelatin. The tissues from the gums of the pig consolidated immediately upon cooling. All of the others remained fluid. Then subjecting these to chemical examination, he found a trace of gelatin from the pulps of the teeth of the old cow, and no gelatin whatever from the pulps of the teeth of the young animals. In summing up his evidence at the close of the account of his experiments Dr. Röse says, "It is evident

from this examination that the processes found in the pulps of teeth, except just a few about the blood-vessels, cannot be gelatin-forming processes, because gelatin is not formed from them." This is an unexpected confirmation of the views which I expressed a number of years ago, and which you will find in the "American System of Dentistry." It is a view of this subject of sensitiveness of dentin that seems to me should be generally accepted, because it seems to me to be correct, and the facts on all sides seem to bear it out. This sensitiveness is conveyed through the dentin simply. It is not a sensitiveness of the lime-bearing portions of the dentin. When we touch a fibril we in effect touch the pulp of the tooth, and thus we get sensitiveness.

Another point aside from this paper, bearing upon this to which I want to call your attention, and showing steps by which this study has been carried on, is the work of Professor Miller on injuries to the tusks of elephants. This is one of the noblest works of Miller—a very laborious examination of many specimens. In the whole series there is not a change occurring in the dentin that was already formed at the time of the injury to the tooth. After the injury the pulp has done something to close up and repair, but always from the pulp, if internal. In other instances, those in which the injured portion was still within the jaw, the cement-forming membranes have done something to close up on the outside, but the formed dentin, never. This is exactly in line with and in confirmation of things that were touched on to-night in this paper.

But to me the most interesting feature of the paper has been that in reference to caries. This study, as I have said, has been going on since the time of Robertson, who pointed out the general fact seemingly by intuition. He could not demonstrate it, but knowledge of it has been growing, thought upon thought, fact upon fact, ever since. Tomes saw the enlargement of the dentinal canal years ago. Leber and Rottenstein took up the work and showed the deposits upon the surface, and in the outer portions decaying dentin, to be vegetable formations, or plants—they were micro-organisms. Then came the work of Milles and Underwood, and then that great noble work of Miller. I have made a few contentions along this line myself. I have shown to our men out West, before societies and to those who have come to see me, how by various modes of culture gelatinous masses could be formed filling the tubes of fluid culture-media to such an extent that they may even be thrown across the room without wetting the cotton stoppers, that they were so matted with gelatinous material that the fluid would not run. These tubes have been turned bottom side up, and yet the broth, which before planting was perfectly clear and limpid, would not run, because of the formation of these gelatinous masses. Dr. Harlan has seen that. I have picked them off from the surfaces of the teeth, examined the cohesive properties of them, and I have contended over and over again—not new or original with me—that it was under these attached masses that the beginnings of decay occur, but never arrived at a

demonstration of it. Now Dr. Williams shows this thing, makes a demonstration of it, and shows the micro-organisms in apposition doing exactly this thing. After his demonstration, it is hardly necessary to follow this up further than to impress upon you this one grand fact. It is not ideal, not worked out theoretically, and found that it must be so, but actually demonstrated that it is so by showing the thing in position upon the screen to-night.

The thing that has seemed to be harder for men to get into their minds and keep there, that I have had to hammer over more than anything else, is this relation of acids to caries. Caries is not caused by free acids in the mouth, nor by acid saliva. We may have caries going on like wildfire in mouths where the fluids are alkaline or neutral. It is not the free acid in the saliva of patients' mouths at all that causes caries. You saw those gelatinous layers of micro-organisms illustrated on the screen to-night, and it is the acid developed by fermentation under those masses of micro-organisms in intimate contact with the tissues of the teeth that causes caries, and not the acids that may be afloat in the saliva.

In connection with this another point was also illustrated. It has been my fortune (or misfortune) to run into a series of observations and demonstrations that have shown, as I think, that it is not hard teeth that stand best; it is not soft teeth that decay most. In fact, as related to decay, soft teeth and hard teeth have no existence. The differences in density are very slight, and have no relation to teeth that decay much or decay little. I did this work without any knowledge that Dr. Williams was at work on practically the same thing. I have not seen him nor had any correspondence with him since we were here in New York eleven years ago. I did not know that he was at work on this subject until he began to publish his papers recently, and he did not know that I was at work on it. We have worked at these things in entirely different ways, and from different standpoints, and now he comes here with a demonstration from a different plan of work, from a different standpoint entirely; but the conclusions are the same. Many of you perhaps remember the little work I published in the Cosmos in 1891, in which I described the tearing down of the enamel and the separation of the enamel-rods. I did not know that that would be thrown on the screen, as you have seen it this evening. I had never been able to get such views of it as you have had this evening, yet I had gotten enough of it to be able to make out the process, as I find, correctly. This evening we have had it placed on the screen in such a way that none of you can mistake it, and we know just how it occurs.

Last year some one asked me here, "What do you do with the soft teeth?" You do not find any in the sense in which the word is usually used. We find teeth with imperfections, of course. What you do find is *softened* teeth. Did you see on the screen those long lines between the enamel-rods, where the cementing material had been dissolved out? I guess you can cut that enamel easier than you can cut perfectly sound enamel, and I guess after the demonstration you have had to-night, you will be likely to cut

wider than you have been doing heretofore. I can only hint at these things, for there is not time to go into them fully.

Dr. Williams has brought you a tooth from the mouth of a man over fifty years of age, lost by becoming loose in its socket. This person had no caries of the teeth—was practically immune from it. He cuts a section of the enamel and throws it upon the screen, and you find it is imperfect enamel,—a very imperfect specimen. He brings you teeth of various animals—imperfect specimens. They have not decayed. He brings you a tooth that has been loosened, from the mouth of a woman of thirty-five years, who was practically immune from decay, and yet its enamel is imperfect. You are not to suppose from this that it is the imperfect teeth that stand best, because we cite these particular cases to show you that it is the condition, the environment, that is responsible for caries, and that the tendency to caries is not in the teeth themselves,—the poorest enamel is sufficient to resist if the environment is good; while on the other hand, no matter how perfect the enamel may be, caries will occur if the environment is bad. The strongest enamel is not able to resist, if the predisposition is there, and the exciting cause is roused to activity. The exciting cause, the micro-organisms, are always there. I have not found any mouth that did not show the micro-organisms we find in carious teeth,—even those that are immune from decay and pass through a life of fifty to sixty years without having caries; but the predisposition to caries was absent, and the person was immune, although the exciting cause might be there. A definition of this predisposition was given this evening,—a very good one I think.

This much in regard to the hardness and softness of teeth. I want you to take that home with you and ponder it well. I believe it is on this basis that we are in the very near future to improve our practice to the saving of fifty per cent. more teeth than we save to-day. It is this that impels me to insist upon this before you this evening. It is this that impelled me to insist on this when I saw you here last year,—not simply as an isolated factor of no value. It is a fact of extraordinary value. When you find these "soft" teeth as you say—"softened" teeth as I say—you have found conditions that require your best energies and your best skill as dentists. You have found rapidly decaying teeth where the exciting cause is active and a predisposition is then prevailing to caries. By persistence and care, doing your work in a radical manner, within a few years you may see the time with that patient when that active cause is in abeyance, and the tendency to decay is passed; but if decay is not continuously eradicated, as it comes up, it is destruction. If we understand it, and go at it with a will, we will save teeth where we formerly lost them. I do not pursue this, nor does Dr. Williams or any one else pursue this simply for the fun of doing it; but because in the scientific expositions we find not simply scientific facts that are of no value to us, but the true basis of practice; and until our practice is based upon these demonstrations instead of the clinical observations that we hear so much about, we will be continually making mistakes.

I do not decry clinical observation. It is valuable, but it does not count for all. It is like the gentleman who lost his way, and when he was referred to the compass, said "That thing is wrong." We go wrong, and by these instrumental demonstrations we get right, if we will read aright their interpretation. I want to say as I have said frequently before, we may wrongly interpret scientific instruments, but scientific instruments do not lie to us. If we do not understand their language, it is our fault. We may misinterpret them, but when we can interpret them correctly they tell us the truth. These pictures, if we interpret them correctly, tell us the truth. There has been no tampering with them. They are untouched photographs of the actual object. Just so my instruments for measuring the strength of enamel or dentin or the specific gravity of dentin, do not lie. Possibly they may be misinterpreted by this or that teacher; hence I gave to the profession the whole result, that they might interpret for themselves, and here we find an interpretation coming from another direction entirely. Please bear this in mind, that the paper of Dr. Williams is not simply a scientific paper, but it is a paper furnishing us a sounder basis of daily practice than we have ever had before.

Dr. H. H. Burchard, Philadelphia. We have no choice as to our manner of viewing this work of Dr. Williams; we are compelled to accept it as an irrefutable demonstration. His chain of evidence is quite as complete as is ever demanded. This work marks a historical epoch in dental science, and it is eminently fitting that it should be presented at a great anniversary meeting of a celebrated society. Some years ago I expressed to Dr. Kirk, the editor of the Cosmos, the conviction that the time would come when it would be demonstrated that the enamel was built up as any other epithelial tissue, by a proliferation of cells from a constant germinal layer. This persistent layer would reproduce cells saturated with calcoglobulin, which would be given off at the distal ends of the ameloblasts,—*i.e.*, the ends farthest removed from the source of nutrition. This theory did not include nor was there any conception of a fibrous basement stroma, or an intercellular substance. I predicted at this time that if Dr. J. L. Williams continued his work in embryology, he would probably be the one to furnish the solution to the problem. This belief was founded upon the philosophical character of all of his previous work. I saw and pointed out (unsatisfactorily) in 1894, that the enamel-organ was the anatomical analogue of a gland, and thought I had made an original discovery, until I found that Dr. Williams had pointed out the analogy about nine or ten years before. It seems to me that although many of us have set aside the histological and pathological work of Bödecker and Abbott in this field as founded upon indefensible, or at least undemonstrable premises, we should at least credit them with the observation or exhibition of globular forms in enamel; although they attributed these forms to a physiological impossibility,—*i.e.*, nutritive changes in formed enamel,—they certainly presented drawings which exhibited the built-up form of the enamel-rods and drew false deductions from them.

The important question which confronts us now, is the precise difference existing between enamel as a tissue, and the phosphato-carbonate of calcium, its mineral basis. What is the precise nature of this albumen-like material, in which the globules are deposited, and what is the change which occurs in enamel in the process of hardening or petrifaction? and what change occurs in calcoglobulin in hardening? If there is no organic matter in enamel, what becomes of the albuminous basis-substance? Even though chemical analyses have given nothing but a mineral composition of enamel, I am inclined to believe that there is a flaw in such analyses.

Until more conclusive evidence is produced, I do not see any escape from a belief that enamel is composed of a phosphato-carbonate of calcium, united with an albuminous base, in which the organic portion has in some undeterminable way lost its identity. Dr. Williams's work clearly shows that the interglobular or interprismatic substance has its calcium salts held in a combination more readily dissociated than that of which the globules are composed. Whatever the difference of composition may be, the latter certainly offers a greater resistance to the solvent action of lactic acid than does the former, and both are more resistant than the supposed mineral equivalent.

A search for the predisposing cause of a disease affecting a tissue is naturally directed first toward a search for anatomical variations in the tissue,—we examine its anatomical structure. Has or has not Dr. Williams shown that anatomical organization is not a factor in the breaking down of enamel? In the first place, viewing the comparative solubility of the globular bodies, and the interglobular substance, it is evident that the readiness of enamel dissolution would be in the direct ratio of the amount of intercellular substance present, and there are variations in this direction; and again the dissolution should proceed rapidly or slowly (all other factors equal) according to the mode of chemical arrangement of the enamel components, the degree of intimacy with which the calcium salts are combined with the albuminous base. The influence which the physiological environment of the mouth might exert in the prevention of caries could only be by the prevention of the growth of organisms producing caries; either those producing lactic fermentation or the saprophytic fungi which break down the organic matrix of the dental tissues subsequent to decalcification.

It seems to me that there is a factor of essential importance which enters into a consideration of the development of lactic ferments,—their food supply. As a generalization, it may be stated that races which are in the habit of using cooked starchy foods are those in which caries is most prevalent. The cooking of starchy foods causes a bursting of the cellulose capsules in which the starch-granules are inclosed, and the starch is in a condition in which it agglutinates and collects in interstices; becoming ptyalized, the starch is then in conditions and positions which invite lactic fermentation. Personally, I believe this is to be one of the

most important factors in the lactic fermentation in the human mouth. Another element would be the outward forms and positions of the teeth, together with faults of structure which would cause the retention of the pasty masses.

In studying the dissolution of the enamel, we are not confronted with the perplexing problem of the vital resistance of the tissue, because it has no vital resistance; it is as dead or deader than the ends of the nails. When the disease invades the dentin, we have this additional factor to consider, and at present I certainly do not believe that the vital parts of the dentin play a perfectly passive part in the disease of caries, nor am I convinced that the vitality or structure of the dentin has nothing to do with the progress of caries. Indeed, until further evidence is produced, I hold to the belief that the general health of the individual is a modifying factor in the rapidity of the invasion of caries, and this not only in the production of those oral conditions which favor the development of the active causes of caries, but in the condition of the vital parts of the dentin. This belief is based solely upon clinical records, for Dr. Black's investigations do not confirm nor deny it. Do not understand me that I even hint at the possibility of a retrograde metamorphosis of the dental matrix; but I certainly do believe in the existence of some form of constructive action by the prolongations of the peripheral cells of the pulp.

I want to draw a distinction between my ideas in this direction and the idea of the followers of the Heitzmann school. When I speak of dentin playing an active part, I mean the odontoblastic processes, not the basis-substance of dentin. This latter is a formed product, and necessarily plays a passive part in disease processes; any change which occurs in the dentin due to vital activity cannot extend beyond the outer walls of the sheaths of Neumann; but that changes do occur which lessen the original caliber of the dentinal tubuli I think very probable; not, however, the deposition of lime-salts, but the actual formation of additional basis-substance at the expense of the dentinal fibrillæ.

The subjects which Dr. Williams presented cannot be discussed in one evening, or in a month of evenings; he has given us a firm basis for years of study. As to criticism, his work as presented admits of none. It is a presentation of an absolute demonstration. He, Dr. Miller, and Dr. Black have all earned a measure of gratitude from the dental profession and scientific world, which we should gladly accord them, now and in all future time.

Dr. R. H. Hofheinz, Rochester. I have little to add but my admiration for the beautiful and convincing results of Dr. Williams's indefatigable labor.

I was particularly interested to hear from Dr. Williams on the subject of specific bacteria of enamel decay; a field which he tells us, however, he has not yet thoroughly investigated.

Miller has found many sections of dentinal decay which apparently contained cocci only; he has also found pure bacillus infections; this hardly justifies the belief that there is a bacillus or a coccus decay. The bacterium which has the greatest ferment

power—acid-forming capacity—will always remain the one which is responsible for the primary attack on enamel, and the bacterium which has the greatest power to dissolve the albuminous substances—peptonizing power—will always remain the one to affect the dentin.

Whether we shall be able to separate them to a minute degree remains to the future, and it is sincerely to be hoped that Dr. Williams may give to dental bacteriology such valuable additions as he has given us to-night in development and pathology of enamel.

Dr. JAS. MCMANUS, Hartford, Conn. The Odontological Society has to-night set the pace for 1897. The lecture we have just listened to, with the wonderfully beautiful pictures selected for its illustration, tell only in part what a great amount of thought, study, and time must have been expended by Dr. Williams in preparing for this talk to the members of this society, and later through the journals to be given to the dentists of the world. It is not to be expected that many busy workers will take to microscopical and histological investigations, for there are many that have eyes and see not, and many that are color blind, while the few that have entered on this course of study and investigation differ often so widely in their conception of what the microscope reveals to them that the few would-be amateur investigators are early discouraged and decidedly uncertain what to believe, or who to pin their faith to. There are few in this gathering to-night who would dare attempt to disprove any of the statements made by Dr. Williams, while all are grateful to him for the delightful evening he has given us, and for the pictures, as pictures that were so beautifully thrown onto the screen. We are to-night content to accept gratefully all that he has so freely given to us. Before the germ theory was evolved, and the general use of germicides and antiseptics, many of the old-time dentists were in the habit of telling their patients the old aphorism, "Clean teeth, sound teeth." The practical lesson briefly stated by Dr. Williams in his closing remarks for all to ponder over is the absolute necessity for early, constant, and thorough cleanliness of the mouth and teeth, and careful thorough operations when required.

The PRESIDENT. We have with us this evening Dr. Edward C. Kirk, of Philadelphia, and we would be pleased to hear from him.

Dr. KIRK. It would be a work of supererogation to add any words of praise to what has already been said of this magnificent exposition. It covers so much new and valuable matter, that it would be impossible to touch upon all, therefore I shall confine myself to one point that has arisen. I think Dr. Williams has made it clear that the structure of the enamel-prism and of the interprismatic substance is composed of practically the same ultimate material; that the breaking down of the enamel-structure is caused by the action of certain acids, generally lactic acid, following the lines of least resistance through the enamel-structure, and that these lines of least resistance are marked out by the territory occupied by the interprismatic cement; that is to say, calcoglob-

ulin, which constitutes the cement-substance between the enamel-prisms, seems to be more soluble in lactic acid than the calcoglobulin structure in the cell itself.

Perhaps the most surprising statement made by Dr. Black in his investigations, the one most difficult of acceptance, and the one he has reiterated here this evening, is that the terms "hard teeth" and "soft teeth" have no existence, so far as their relation to dental caries is concerned. The thought has occurred to me that we may have in the enamel a structural condition somewhat analogous to that found in what is known in mineralogy as "pudding-stone,"—a variety of rock found in the Shawangunk Mountains and elsewhere, which consists of an agglomeration of silicious pebbles bound together with a silicious cement, just as we similarly have in enamel a more or less amorphous cementing substance holding regularly organized globules together, both having the same ultimate chemical composition. The density or the resistance which such a structure would have to crushing stress in mechanical tests like those made by Dr. Black probably would be almost exactly the same regardless of the kind of calcoglobulin, whether it be that regularly laid down in the ameloblasts or that which forms the interprismatic cementing substance which preponderated. But when viewed in the light of relative solubility, we may find an entirely different resistance from that manifested in respect to mechanical stress. It has been shown further that enamel varies greatly in its structure, that in some specimens the relative proportion of this interprismatic substance to the enamel-prisms is much larger than in certain other forms of enamel, therefore if we have a relatively greater amount of this interprismatic substance, we would have a greater solubility; and it seems to me that while the question of hard and soft as related to density may be substantially as Dr. Black has shown it to be in his studies of mechanical stress and chemical composition of tooth-structures, yet it has not been shown that their resistance to the lactic acid solvent is at all the same. In fact, from what we have been shown to-night it would seem to be quite variable.

I am loath to give up the idea that there is a difference among teeth in regard to resistance to the carious process. This difference in the solubility of the regularly laid down calcoglobulin as we find it in the enamel-prism, and the interprismatic cement-substance, may throw some light on the causes of the differences clinically observed in the resistance of different teeth to the invasion of caries.

Dr. A. W. Harlan, Chicago. It is well known that the subject under discussion to-night is one of very great importance to the whole profession, and it is equally well known that it is one with which I am only slightly acquainted. I would not rise at all, except to add a word of encouragement to the author, and say to him I most thoroughly and heartily appreciate the work he has done in this line. I am one of the strong believers in the art of building up a profession, that every part and portion and substructure of it must be added little by little in all of its lines, and I am proud to-

night to say that I think our friend and fellow-countryman and guest this evening, Dr. Williams, has added a very large part to that branch of science to which he has devoted himself so assiduously for many years, not only at home but abroad.

Dr. R. Ottolengui. As the hour is so late, I shall endeavor to be brief in my remarks. That I am called at all to speak, knowing practically nothing about histology, can only be explained in my mind by the desire on the part of the committee to have some expression of opinion from the standpoint of the every-day practitioner. During the progress of the paper, a prominent gentleman next to me asked me, "Shall you be able to fill a tooth any better to-morrow?" and I answered at that time that I would be better able to answer to-morrow. I am able to answer now that I shall certainly be very much better able to fill teeth to-morrow. The question that has worried us as to the cause of decay has not only been absolutely answered, but it has been answered in such a way that it immediately disposes of many practical questions,—too many for me to go into to-night, but one is of sufficient importance for me to touch on for the benefit of practical men present. We have all been taught to cut out, in filling teeth, the sulcus which is adjacent to the decay. Clinical evidence proves that many people fail to do that. They cut out the decay which is evident to the naked eye, and let the patient go. When it is known, as it has been shown so beautifully here to-night, that the active cause of decay passes down between the rods of the enamel, what excuse can there be in the future for leaving those sulci, which must be the breeding-place of the bacteria?

When some of the slides were on the screen, we saw that long before the decay had actually occurred the inroad of the acid was plainly discernible. How can we honestly leave decay in teeth again? I only touch on these points to show that when these scientists bring out what may appear to the thoughtless to be dry science, if they give us the smallest foundation on which to stand, we can continue to erect an edifice of which the dental profession may be proud.

In the past we may have been able to fill teeth with mechanical accuracy; in the future we should be able to fill them with scientific perfection.

Dr. Black. In answer to what Dr. Kirk has said about imperfect enamel, I wish to say that I suppose in order to make an exhibition of the varieties of imperfect enamel, Dr. Williams has selected from hundreds of cases in order to get these specimens of enamel, while the great majority of cases he has ground have been comparatively perfect enamel. I always have admitted these imperfections of enamel, and have pointed to them as giving opportunity for caries.

Dr. W. Jarvie. I should like to ask Dr. Williams a question, if he will kindly answer it. He has demonstrated most positively by the slides that micro-organisms cause decay of the teeth, and yet sometimes we find decay on the point of the cusp of bicuspids, and we all know that that is of all places in the mouth the place

where micro-organisms would be the least likely to lodge. How does he account for caries in such a locality?

Dr. WILLIAMS. There is hardly anything left for me to say, except to return my very hearty and sincere thanks for all the kind things that have been said. I was laboring under a very great disadvantage during the lecture from attacks of vertigo, and I doubted whether I made myself intelligible.

There are only two points which I need touch upon in closing the discussion. I think Dr. Kirk has misunderstood my position, and also the position of Dr. Black, if I understand Dr. Black correctly, for we both do admit that there is a very great difference in the liability of teeth to decay, providing the true predisposing cause is present, the cause which gives effect to the active cause. That predisposing cause is well defined in the quotation which I made, that conditions of the fluids of the body and of the cells which take away their inhibitive power, cause decay; but providing they are present and the predisposing cause is present, there is a wide difference in the rapidity of decay and the liability to decay. The most perfect enamel that was formed will not decay if the true predisposing cause is not present, and the most perfect will decay if the predisposing cause and the active cause is present. It all comes back to the predisposing cause.

With regard to Dr. Jarvie's question, it is very difficult to answer that. I ground perhaps twenty specimens before I selected one as a typical case; but I found my micro-organisms in places where one would not suspect them, and it is perfectly true that on the tips of the cusps of bicuspids and cuspids and molars there are sometimes imperfect spots which you would not detect with the naked eye, which might furnish a harboring place for micro-organisms. I was particularly gratified with the remarks of Dr. Ottolengui. If this work means anything to me, it means we have a better basis for immediate practical work. It means a more thorough cutting out of sulci, as he has pointed out, and a more thorough use of germicides in the preparation of cavities for filling, and also in the mouth.

I do not want to appear over-sanguine as to the future, but I thoroughly believe that germicides will be given us with which we can to some extent combat the ravages of decay, and I am perfectly certain from four to five years' experience with such germicides as hydronaphthol and others, used in pastes, powders, etc., speaking within bounds, that thirty-three to fifty per cent. has often been prevented. I feel sure that patients for whom I have prescribed, do not have one-third to one-half the work done. We have many germicides which must be tested, and others are certain to come; and it is not beyond the region of probability that we shall get a germicide which may be used in the mouth in conjunction with pastes or powders, that will mark a step forward in the preventing of decay, which is of more importance than the cure of it or the arrest of it after it has once started.

Theoretically it is possible to arrest decay; practically of course it is not always possible. With proper care, and with such germi-

cides as we have, a great deal of decay could of course be prevented, but all persons do not take such proper care.

Adjourned.

JOHN I. HART,
Editor Odontological Society.

DENTAL SOCIETY ANNOUNCEMENTS.

AMERICAN MEDICAL ASSOCIATION.

THE semi-centennial meeting of the American Medical Association will be held in Philadelphia, Pa., June 1 to 4, 1897.

Much interest centers around it, since fifty years ago this association held its first meeting in the city of Philadelphia. Unusual preparations are being made to have it the most important meeting in the history of the association.

The officers of the Dental and Oral Section invite the dental profession to attend this meeting and take part in the discussion of the papers. Those wishing to become members can do so by obtaining credentials from their state or local dental society, and presenting them, with the sum of five dollars, to the secretary. The program is here presented:

Chairman's Address. Dr. R. R. Andrews, Cambridge, Mass.

"A Plea for Conservative Oral Surgery, with Practical Illustrations." Dr. G. Lenox Curtis, New York, N. Y.

"Sterilized Roots of Beasts' Teeth as Supports for Porcelain Crowns." Dr. W. E. Walker, Pass Christian, Miss.

"Tumors of the Maxilla." Dr. William Knight, Cincinnati, Ohio.

"The Influence of Diseased Teeth upon the Adjacent Structures." Dr. J. Taft, Cincinnati, Ohio.

"Etiology and Treatment of Inflammation of the Anterior Pillars of the Fauces." Dr. George T. Carpenter, Chicago, Ill.

"Pathologic Conditions of the Throat and Contiguous Structures during Early Childhood Prime Factors in the Causation of Irregularities of the Maxilla and Teeth." Dr. William A. Mills, Baltimore, Md.

"Dental Faculties in Medical Schools." Dr. Richard Grady, Baltimore, Md.

"The Need of Dental Instruction in Medical Schools." Dr. Edward Branigan, Boston, Mass.

"A Series of Clinical Cases." Dr. Vida A. Latham, Chicago, Ill.

"Hyperkinesis of the Muscles of Mastication a Symptom and an Etiological Factor in Nervous Affections, particularly Neuralgia of the Trigeminus and Diseases of the Jaws." Dr. G. V. I. Brown, Duluth, Minn.

"The Relation of Dentistry to General Medicine." Dr. George F. Eames, Boston, Mass.

"Cataphoresis *vs.* The Use of Electricity Alone for Obtunding Sensitive Dentin." Dr. W. G. A. Bonwill, Philadelphia, Pa.

"Fraternity." Dr. A. C. McCuidy, Towson, Md.

"Pyorrhea Alveolaris in Mercurial and Lead-Poisoning and Scurvy. Paper No. 4." Dr. E. S. Talbot, Chicago, Ill.

R. R. ANDREWS, *Chairman*,
Cambridge, Mass.
EUGENE S. TALBOT, *Secretary*,
Chicago, Ill.

PACIFIC COAST DENTAL CONGRESS.

THE time for the meeting of this congress has been changed from August 17 to July 13, 1897 (continuing four days), so as to give delegates from the East, and elsewhere, a chance to take advantage of the extremely low rates of fare offered to the Christian Endeavor visitors.

Our congress will meet the week following the Endeavor Convention; and as the rates are open to all, and cover a period of several weeks, it will be an excellent opportunity for the profession to visit San Francisco.

As chairman of the Invitation Committee, I desire to extend a hearty invitation to the members of the dental profession to join us in this meeting, which we hope to make a grand success.

W. Z. KING, *Chairman*
Invitation and Membership Committee,
1001 Valencia st., San Francisco, Cal.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

THE annual meeting of the South Carolina State Dental Association and the State Board of Dental Examiners will be held at Harris Lithia Spring on Tuesday, July 20, 1897.

A cordial invitation is extended to all members of the profession to attend this meeting. Board will be furnished at the rate of one dollar per day.

R. ATMAR SMITH, *Rec. Sec.*,
285 King st., Charleston, S. C.

TEXAS DENTAL ASSOCIATION.

THE annual meeting of the Texas Dental Association will be held at Waco, commencing Tuesday, May 18, 1897, and continuing through four days. The profession generally is cordially invited. Rates from points in Texas will be one and one-third fares. We hope to meet many of our friends out of the state this year at this meeting.

J. G. FIFE, *Secretary*,
Dallas, Texas.

KENTUCKY STATE DENTAL ASSOCIATION.

THE Kentucky State Dental Association will hold its next annual meeting at Owensboro, Ky., June 17, 1897.

The State Board of Examiners will meet at same time and place.

For information address

J. H. BALDWIN, D.D.S., *Secretary*,
307 West Broadway, Louisville, Ky.

Union Meeting.

The union meeting of the Maryland State Dental Association, the Washington City Dental Society, and the Virginia State Dental Association will be held at Old Point Comfort, Va., May 7, 8, and 9, 1897.

Members of the dental profession of other states are cordially invited to attend.

Williams Donnally, *Chairman Joint Committee.*

Lebanon Valley Dental Society.

The twenty-second annual meeting of the Lebanon Valley Dental Society will be held Tuesday and Wednesday, May 18 and 19, 1897, at Lititz, Pa. An interesting program has been arranged, and members of the profession are cordially invited to be present.

C. R. Scholl, D.D.S., *Cor. Sec.*

Dental Commissioners of Connecticut.

The Dental Commissioners of Connecticut will meet in the Supreme Court rooms at the capitol in Hartford, on Monday, May 17, 1897, at 10 o'clock, to examine candidates for license and attend to all matters proper to come before them. Persons desiring to practice in this state must apply to the recorder for proper blanks, which they will fill out and return to him before the day of examination.

George L. Parmele, M.D., D.M.D.,
Dental Commissioner and Recorder.

Massachusetts Board of Registration in Dentistry.

A meeting of the Massachusetts Board of Registration in Dentistry for the examination of candidates will be held in Boston, at Dr. Dowsley's office, Evans House, 175 Tremont street, Monday, June 14, 1897, at 10 A.M. Hereafter the board will hold three meetings a year, in June, November, and March.

E. V. McLeod, *Secretary,*
New Bedford, Mass.

Examining Board of South Dakota.

The State Board of Dental Examiners of South Dakota will hold its regular annual meeting at Vermillion, South Dakota, June 2, 3, and 4, 1897.

F. W. Blomiley, *Secretary,*
Sioux Falls, S. Dak.

Northern Ohio Dental Association.

The thirty-eighth annual meeting of the Northern Ohio Dental Association will be held at Put-in-Bay Island, June 15, 16, and 17, 1897.

F. W. Knowlton, *Secretary,*
Akron, Ohio.

Michigan Dental Association.

The Michigan State Dental Association will hold its annual meeting at Battle Creek on June 8, 9, and 10, 1897.

A feature of this meeting will be a hygienic dinner given to the members of the association at the Battle Creek Sanitarium by Dr. J. H. Kellogg.

Henry C. Raymond, *Secretary*,
111 Woodward ave., Detroit, Mich.

EDITORIAL.

Our National "Beggar on Horseback."

The evolution of organizations as well as that of individuals expresses itself by a development from the simple and homogeneous into the complex and heterogeneous. The effect of this process upon the central idea or principle which has constituted the initial motive in many reform movements tends to obscure their original purpose. The growth of such movements proceeds by an accretion of ideas which by their accumulation are likely to become burdensome to the class they were intended to benefit. After a time a reaction ensues whereby a restatement of the original principles is made, that which is superfluous and burdensome is eliminated, and whatever of truth was contained in the reform idea is given a new potentiality by its liberation from the limitations of error which had surrounded and obscured it. Numerous examples of the operation of this evolutional factor are furnished by the history of the development of the social order in connection with religious reforms and the growth of statutory regulations in the government of society.

A pertinent illustration of the same process is furnished by the records of the National Association of Dental Examiners, especially by a comparison of their latest published proceedings with those pertaining to their earlier history.

The objects of the National Association of Dental Examiners as set forth in their constitution adopted August 6, 1883, are "to secure, through the operation of the various State Examining Boards, a high and uniform standard of qualification for dental practitioners, and, so far as practicable, uniformity of methods in the working of these boards and of legislation in creating them;" and by Article VIII of the same, "All State Boards belonging to this Association shall be bound by its action, so long as they continue members of it. Any Board refusing to be bound by the action of this body shall from that time cease to be a member thereof."

The objects of the Association, as stated, are such as should enlist the support and compel the approbation of every reputable practitioner of dentistry. They represent the ideals for which the better men of the profession have industriously labored from the beginning, and in so far as the methods of the Association have been in harmony with its purpose correctly construed, the moral support of the thinking men in dentistry has been freely accorded it.

But like the majority of stated objects, the purport of the article setting forth the objects of the National Association of Dental Examiners is capable of more than one construction. This is amply demonstrated in the interpretations put upon it by the members from time to time and reflected in their annual transactions. At its earlier meetings, or at least at its first meeting, no definition of the plan by which its objects were to be attained was formulated, though not long afterward symptoms of a policy of action were manifested in the shape of resolutions instructing, recommending to or demanding of the dental educational institutions of the country through the several state boards of examiners, certain reforms in their educational methods upon penalty of a withholding of the stamp of reputability which the National body was pleased to confer upon those institutions which acceded and lived up to its regulations and requirements. This marked the beginning of, and in general, characterizes a policy which has been pursued as a means of dental educational reform by the National Association of Dental Examiners until the present time.

The right to propose or recommend a reform and the power to compel it are widely separated functions, and in the present contention a clear definition of the rights and powers of the parties in interest is of vital importance to the dental educational interests of this country. In view of the magnificent proportions which the dictatorial policy of the National Association of Dental Examiners has assumed with respect to our educational methods, it is certainly pertinent that we should critically examine the situation and endeavor to ascertain just what is our supreme tribunal of dental education, and whether its authority is vested in the National Association of Dental Examiners or the National Association of Dental Faculties.

As has been pointed out in this journal on a previous occasion, the right of a state to determine for itself what shall be the standard of qualification demanded of dental practitioners within its territorial limits is absolute and indefeasible; it is a function of the

police power conferred upon the states by the Constitution of the United States. It is by this right and under the police power that state boards of dental examiners are created and from which they derive their legal authority. "When the successful prosecution of a calling requires a certain amount of technical knowledge and professional skill, and the lack of them in the practitioner will result in material damage to the one who employs him, it is a legitimate exercise of the police power to prohibit any one from engaging in the calling who has not previously been examined by the lawfully constituted authority and received a certificate in testimony of his qualification to practice the profession. The right of the state to exercise control over skilled trades and the learned professions, with the single exception in respect to teachers and expounders of religion, has never been seriously questioned."* The state, through its legislature, having enacted a statute defining what shall be the standard of qualification required of all who engage in the practice of dentistry within its borders, a board of dental examiners becomes a necessary adjunct to the dental law for the purpose of carrying into effect the restrictions imposed by the statute. The function of the dental examining board of a state is therefore purely and exclusively executive. The most liberal construction of its purposes and powers can never invest it with an educational function. Notwithstanding this fact, the desire and tendency of some having representation in the National aggregation of state boards has been to engraft upon these distinctively executive organizations the educational feature, not directly as teaching bodies, but indirectly through an unwarrantable and illegal stretch of their powers. That this tendency has become a settled policy of the National Association of Dental Examiners is abundantly shown by their last annual report.

That remarkable document has been published since January of the current year, and has, so far as we are aware, passed without public comment by the profession. We were not favored with a copy of the report for publication in this journal, which may in some degree explain the absence of comment upon it on the basis that but a minority of the profession have read it. Certainly it is not lacking in features interesting and important enough to arouse the attention of the most apathetic.

The "Codified Rules and Conditions for Obtaining and Maintaining Recognition of Dental Colleges by the National Association of Dental Examiners" adopted by and now part of the organic law of the Association is as follows:

*Tiedeman's "Limitations of the Police Power," p. 200.

1. A formal application for recognition shall be made by January 1, 1897, by each college now organized desiring such recognition; and colleges hereafter organized shall make such application within the three months next succeeding their organization. All such applications shall be made upon blanks to be obtained from the committee on colleges of this association, and shall answer in full all the questions contained in the same.

2. The preliminary requirements prescribed by the National Assembly [sic!] of Dental Faculties must be accepted and carried out in good faith by the colleges recognized by the National Association of Dental Examiners, provided that the standard adopted by the National Association of Dental Faculties at Saratoga in 1896 is not lowered. Where such *certificate* as thus required cannot be presented from state school authorities by the applicant for matriculation, his or her qualifications shall be tested by an examination, conducted according to this standard, by prominent local educators, approved by a state board of dental examiners for that purpose; none of the persons thus conducting the preliminary examination shall be members of the faculty of the college to which the application has been made.

3. The statements set forth in the application of any college for recognition shall be verified, after investigation, by the board of dental examiners of the state in which the college is located, or by other persons designated by the National Association of Dental Examiners in case no such state board exists; and the recommendation of such board shall be essential to recognition.

4. The state boards in connection with this association are hereby required to become informed of the character of the dental colleges located in their respective states, as to their equipment, facilities and methods of teaching, and shall report annually to this association wherein they fail to comply with these requirements; and any college which hinders or obstructs a proper investigation by the person or persons making such authorized investigation as may be necessary to carry out this rule shall, when reported to this association, be suspended from the list of recognized colleges until such hindrance or obstruction has been removed.

5. Attendance of students upon three full courses, of not less than six months' duration each, in separate years, with three months' practical instruction intervening between the courses, shall be required before final examination for graduation, and candidates presenting for such examination shall be twenty-one years of age or more by October next succeeding this examination.

6. Each dental college to be on the list of recognized colleges must have a teaching faculty composed of at least eight individuals, as follows, to wit: at least three professors of dental subjects, covering the four branches of Operative Dentistry, Dental Prosthetics, Dental Pathology, and Oral Surgery. For the six subjects in common with general medicine there must be at least five professors, covering the six branches of Anatomy, Physiology, Chemistry, General Pathology (fundamentals), Materia Medica and Therapeutics, and General Surgery. Their students must also be taught the subjects of Chemistry and Bacteriology in laboratories adapted to the purpose and under suitable instructors. That such special college must possess, in addition to suitable lecture rooms, a well-appointed dental infirmary and a general prosthetic laboratory; also each college must be provided with facilities suitable for manual training in operative dentistry, and must furnish in this way systematic instruction to its students.

7. Final action shall not be taken on the application of any college until such college has been admitted to membership in the National Association of Dental Faculties.

8. No college shall be placed or continued on the list of recognized colleges which has connected with it, in any capacity whatever, a member of a state board of dental examiners.

9. No college shall be in the list of recognized colleges which does not state in its annual announcement that it complies with the rules and conditions of the National Association of Dental Examiners.

10. These rules and conditions shall apply to all colleges, including those now on the recognized list as well as to those making application for such recognition.

WILLIAMS DONNALLY,
GEORGE L. PARMELE,
L. ASHLEY FAUGHT, *Chairman.*

The following characteristic symptom was manifested at the last annual meeting, but the prevailing paranoia was evidently not sufficiently epidemic to bring about its adoption, and it was negatived by vote after some discussion:

"*Resolved,* That hereafter all dental departments formed in connection with medical colleges and applying to this association for recognition shall be required to have all the lectures delivered to the dental students in classes separate from the medical students."

Whether this was a new gyration of the co-educational idea or a desperate effort to protect dental virtue against medical contamination, is not made clear in the report. Be that as it may, however, the assumption of control of the educational function contained in the foregoing rules is clear beyond all doubt. The extreme penalty for non-compliance with the conditions demanded is the withholding of the patent of reputability, in which term the Association couches its approval of those institutions which comply with its demands. It is competent, in the face of such an alternative, to ask what is the value of this badge of reputability which the Association confers upon those who yield to its demands, and what is the nature and degree of its power to enforce them.

The old axiom that a stream cannot rise higher than its source applies perfectly to the case in point. The legal power of the National Association is without existence, so far as its own organization is concerned, except in so far as it may hold property and sue and be sued in its corporate capacity, in common with other chartered organizations. Its charter, dated September 12, 1896, which is as follows, confers no other rights or powers:

Know all men by these presents, that we, the undersigned, Henry B. Noble, Williams Donnally and Mark F. Finley, of the District of Columbia,

being of full age and citizens of the United States, and all of us citizens of the District of Columbia, under the provisions of the United States statutes relating to the District of Columbia in such cases made and provided, have associated, and do hereby associate ourselves, and those who may become associated with us into a body politic and corporate under the name of the National Association of Dental Examiners. The term for which said corporation is created shall expire on the first day of January, Anno Domini, nineteen hundred and forty-five.

The purpose and object of said corporation is to secure through the operation of the Dental Examining Boards of the several states of the United States, a high and uniform standard of qualification for dental practitioners, and uniformity of method in the conduct, operation and workings of said Dental Examining Boards, and uniformity in the legislation of the several states creating the same or governing their conduct and operation.

This association shall consist of the undersigned and such different Boards of Dental Examiners of the several states, or the District of Columbia as may elect to join it, and subscribe to the constitution and by-laws hereafter to be adopted by it. The affairs and operations of this corporation shall be conducted and controlled during the year ending August 5, 1897, by a board of three directors.

HENRY B. NOBLE [SEAL].
WMS. DONNALLY [SEAL].
MARK F. FINLEY [SEAL].

WM. P. YOUNG [Notary Public.]
Witness [as to all.]

No national organization, chartered or otherwise, can under the Constitution of the United States be vested with authority or jurisdiction over matters coming within the sovereignty of the several states in the exercise of their police powers. Interference with this doctrine is a matter the import of which is so serious in the economy of our governmental institutions as to strike at the foundations of their whole fabric. Hence, whatever of power the National Association possesses is by virtue of the moral force it can exert in directing the legal machinery of the states within its representation. It has sought to do this in many ways, but mainly by attempting to legalize its stamp of reputability by incorporating in the state dental laws a clause refusing indorsement or examination to the holders of diplomas from institutions not recognized as of good repute by the national body. This method of enforcing its requirements would be effective were it not fatally defective in that such a clause is absolutely antagonistic to the spirit if not the letter of the constitutional clause conferring autonomy upon the states in the free exercise of their police powers. The effect of introducing such a clause into a state law is, however, not simply a negative one by reason of its questionable legality. It exerts a positive harm by bringing wholesome dental

legislation into discredit. For example, suppose an applicant is refused indorsement or examination by a state board because of the embodiment of the reputability clause referred to in its statute governing the granting of licenses to practice dentistry within that state. If the candidate in such a case should consult counsel, as he would be likely to do in order to attain the object for which he had spent his time, money, and labor for three or more years, he would, if fairly advised, test the issue in court to compel the board by mandamus to examine him upon his merits. The procedure is simple and the end quite possible of attainment. He might or might not secure the coveted license, as the result of his examination would determine, but in any event he might easily demonstrate the flimsy character of that portion of the statute, and by bringing discredit upon the dental law tend to weaken the whole structure of dental legislation which has been so laboriously developed to its present point of utility and general introduction.

It must not be forgotten that legislatures are not infallible, and because a statute has been enacted it by no means follows that it is good law. If it were so, the work of the courts would be greatly reduced in volume. The judiciary branch of the machinery of government is the corrective factor in the interpretation of the acts of legislatures.

The reputability clause of the National Association of Dental Examiners or of the National Association of Dental Faculties, so far as we are aware, has not as yet had its legality passed upon by any court of adjudication; but after a careful investigation of the matter we hazard the prophecy that it would not in either case be seriously considered for ten minutes in any court of the United States.

It is perfectly competent for a state to determine its own standards of qualification and of reputability, but no national body can do so without interference with the constitutional right of the state, and such interference is illegal. To make it legal for a national body to have jurisdiction in such a case would necessitate an amendment to the national constitution abrogating the sovereignty of the states in the free exercise of their police powers. What then becomes of the stamp of reputability of the National Association of Dental Examiners, and what real value does it possess as a coercive feature in elevating the standards of dental education? It must be plain that, divested of its legal boo! its effect upon the educational "goose" will be in proportion to the moral force it can exert by a really intelligent effort to carry out its objects as set forth in its constitution and repeated in its charter.

But granting that the "reputability" clause of the National Association of Dental Examiners as a factor of state legislation is technically good law, notwithstanding the fact that its effect is to confer absolute jurisdiction upon a national body in this important right of the state to autonomy of control, is such an abrogation of the state right expedient in the light of the present attitude of the Examiners? Have they exercised their power, real or assumed, wisely and with good judgment and for the best interests of our educational standards? Does the report of their proceedings demonstrate that they are competent to decide upon the best methods for educating those who are to become practitioners of dentistry? Have they shown that wisdom founded upon practical experience as teachers, or that sympathy with educational needs which should entitle their views to serious consideration? Have they demonstrated a familiarity with the existing conditions which have to be practically met in our educational methods? Have they shown a spirit of helpfulness in overcoming the obstacles in the way of bettering our standards? Have their suggestions and recommendations been other than irrational and Utopian, based in an attitude of exclusiveness, shutting themselves off from all college relationships by formal legislation antagonistic to such connections (see Rule 8), and depending upon committees of inspection and general gossip as their sources of official information upon which to frame legislation controlling the activities of our educational institutions? Therefore, again let us ask, is it expedient or just to vest this body, through the channels of state legislation, with control of these matters which in their essence are beyond the competency of a body so constituted to intelligently or equitably control? Be it legal or illegal, the situation is one which should be adjudicated by the collected common sense of our profession as soon as possible, and the unrighteous exercise of such broad powers by a body which has demonstrated its lack of fitness for carrying out its self-imposed trust defined and abrogated within the limits of equity. The effectiveness of the National Association of Dental Examiners depends upon the degree of confidence and respect accorded it by the dental profession, and especially those members of it who are directly concerned with the problems of dental education. Its function is to determine whether students are educated up to the standards prescribed by the state laws, *not how that standard of education shall be achieved.* This latter function pertains solely and exclusively to the educational institutions and their representative body—the National Association of Dental Faculties. The assumption of jurisdiction in re-

spect to the educational methods of the colleges is probably extra-judicial, and in view of its recent attempted extension of authority in this field must at any rate be regarded as impertinent. How, then, under existing conditions, can any degree of uniformity in state dental legislation be achieved?—a consummation upon which all agree as to its desirableness. As was pointed out several years ago, no measure of a uniform character applicable to all of the states could be enacted "unless the profession were content to level downward rather than upward." A higher level may, however, be reached among those states which have the highest educational standard, by incorporating in their several statutes a clause recognizing and indorsing without additional examination the licensees of each state having substantially the same standard of requirements. The natural effect of the continued operation of such an interstate comity clause would be to elevate the standards of adjoining states, and for the elevating influence to in time diffuse itself throughout the Union. The function of the National Association of Dental Examiners with respect to this matter, and its proper course of procedure, ought to need no other definition than that which an average amount of common sense will discover. It is clearly within its scope to see to it that the standard of dental education required for license to practice in the several states is sufficiently high, and that uniformity of dental legislation is secured upon the highest plane possible by the device of interstate recognition of licensees where uniformity upon the desired high plane has been achieved. It should not, because by an equitable interpretation of its powers it cannot, concern itself with the problem of educating men to meet the requirements of the state boards, and its attempts in that direction are an unwarrantable and impertinent interference with the chartered rights and functions of dental educational institutions.

If the National Association of Dental Examiners will content itself with the active prosecution of work in its legitimate field, its power to elevate and unify dental educational standards will be enormous, by forcing the colleges to adjust their results to the levels established through state legislation. But if the Association continues to blindly interfere with the private business of institutions over which it has no more right of jurisdiction than it possesses over the domestic economy of the teachers therein, it will not only bring upon itself the ridicule and contempt of sensible men, but eventually wreck what ought to be one of our most potent agencies for professional progress. Indeed, a study of the

last annual report of the Examiners might well raise a question as to the advisability of an inquiry by the National Association of Dental Faculties into the "reputability" of that body, or at least as to its mental soundness.

The work of the Examiners and Faculties Associations is closely allied, though distinctly separated by a line of demarkation prescribed by common sense and equity, and the ill-advised acts of misinformed enthusiasts should not be permitted to interfere with the active and legitimate co-operation of these two national bodies in their efforts to attain the highest educational results to our profession.

Professional (?) Advertising.

We give space here to the following correspondence, because it fairly sets forth the policy of this journal with respect to one phase of professional ethics that appears to be calling for adjustment. The general importance of the point at issue will, we trust, be a sufficient excuse for the publication of what might otherwise be deemed a somewhat personal matter:

Edward C. Kirk, D.D.S., Philadelphia, Pa.

My dear Sir,—At the regular meeting of the American Academy of Dental Science, held in Boston on March 3, the inclosed resolutions were adopted, and a copy is sent to you for publication.

Very truly,

[Signed] George H. Payne, *Cor. Sec.*

283 Dartmouth st., Boston, March 25, 1897.

"The Academy, viewing with dismay the character of the advertisements appearing in some of the self-styled dental journals whereby secret preparations, often of a highly dangerous character, are paraded in such company and guise as to deceive those not accustomed to scrutinize closely all medicines thus offered, and, more particularly, of advertisements soliciting dentists to advertise, announcing that 'professional dignity and good advertising will work well together,' giving the name and address of the professional 'writer of dentists' advertisements,' and the unscrupulous acceptance by the above-mentioned journals of advertisements, the character of which is detrimental in the highest degree to the advancement of our profession, the best element of which is striving with self-sacrificing and untiring labor to make it worthy the name and title of a liberal and learned profession; therefore,

"*Resolved*, That the fellows of the American Academy of Dental Science strongly condemn such advertising, believing that it is degrading and injurious to the good name of the honorable calling they represent; and they further declare that the editors of such journals, allowing the common tricks of trade to dominate that which should be governed by professional dignity, are unworthy to be acknowledged as teachers and respected confrères among dentists.

"*Resolved*, That this resolution be forwarded to the editors of the leading dental journals, as expressing the sentiment of the Academy."

To the foregoing communication the following reply was sent, with a copy of the letter of the business manager of the DENTAL COSMOS, as noted below. The letter to which it was an answer is printed in connection therewith:

PHILADELPHIA, March 31, 1897.

MY DEAR SIR:

I am in receipt of your letter of 25th inst., inclosing copy of resolutions passed at the last regular meeting of the American Academy of Dental Science, for which please accept my thanks.

It is a matter of extreme gratification to me, that your Academy has taken the pronounced stand in this matter that it has. It seems not only right and proper, but high time that the dental profession had placed its stamp of disapproval upon the habit of unprofessional advertising indulged in by many of our dental periodicals. It is certainly within the province of the management in each case to exercise a supervision over the character of the matter which appears in their advertising pages, on exactly the same ethical basis which is presumably followed in selecting matter for the text.

It may interest you to learn something of the policy of the journal which I have the honor to conduct in its attitude toward the questions under consideration, and to that end I inclose the copy of a communication forwarded to a would-be advertiser who desired space in the DENTAL COSMOS for the purpose of calling the attention of our readers to the advantages to be derived from "professional advertising."

Scarcely an issue of the DENTAL COSMOS is published without our having to deal with this class of individuals, and they are uniformly treated to a letter of declination upon the lines of the one inclosed.

I shall take pleasure in giving space to the resolutions which you have forwarded, and make some favorable editorial comment thereon. I regret that they have reached me too late for publication in the April issue of our journal, but they will be given a place in our May issue.

Yours sincerely,

Dr. GEORGE H. PAYNE, Boston, Mass. EDWARD C. KIRK.

(*Copy inclosure.*)

DEAR SIR:

Yours of the 12th to hand. You evidently do not understand that it is possible for a journal to be run with absolute indifference to the returns from advertising; and perhaps you are not to blame, because you see the mad race made for advertising patronage by the publishers of practically all the newspapers and periodicals of the country.

The DENTAL COSMOS proceeds on no such lines. The foundation idea in its conduct is to produce the best journal *for dentists* that the resources of dentistry will permit. Advertising patronage does not enter into the question. That disposes of the suggestion in your "$25.00 per work."

Coming down to the concrete question of your advertisement. To receive it for publication in the DENTAL COSMOS would be lending (or selling) the pages of our journal to forward one of the things which the Code of Ethics, by which all truly professional dentists are supposed to be governed, condemns in the strongest terms.

The Code says, Article II, Section 3:

"It is unprofessional to resort to public advertisements, cards, handbills, posters, or signs, calling attention to peculiar styles of work, lowness

of prices, special modes of operations, or to claim superiority over other practitioners, to publish reports of cases or certificates in the public prints, or to go from house to house to solicit patronage, to recommend nostrums, or to perform any other similar acts."

According to this, the dentist who advertises puts himself outside the pale of recognition by his *professional* brothers. Our subscription list is mostly among the men who honor the Code. You ask us to flaunt in their faces an invitation to a violation of that Code, and we very respectfully decline.

We cannot accept advertisements of the character of yours.

Yours truly,

[Signed] F. L. Hise, *Business Manager.*

The above was in reply to the following:

"The S. S. White Dental Mfg. Co.,
12th and Chestnut, Philadelphia.

"*Dear Sirs*,—During November I wrote you concerning the insertion of an ad advertising dental advertising in Cosmos. Same did not meet with your approval at that time. I send you inclosed copy of an ad used in the January * * * * * * with good results. I wish to say that my work is for the improvement of advertising methods, and considering the vast amount of bad advertising—distasteful and disgusting—that dentists indulge in, I should think you could regard the insertion of my ad in the light of real missionary work, especially at $25 per work. I should like very much to use your pages, and will thank you if you will write me again concerning the matter. Inclosed I hand you also copy of the circular and samples of my ads that I am mailing in response to requests.

"Very truly yours, ————————."

The following letter from the secretary of the American Academy of Dental Science was subsequently received:

Edward C. Kirk, D.D.S., Philadelphia, Pa.

Dear Doctor,—In my communication to you accompanying the resolutions adopted by the American Academy of Dental Science, the statement that they were for publication was an error on my part. The resolutions as adopted were to be sent to the editors of the leading dental journals.

The Academy leaves the publication to the discretion of the editor.

Very truly,

George H. Payne.

283 Dartmouth st., Boston, April 8, 1897.

The vital question of the unethical character of trade journalism appears to be in a languishing, if not comatose, condition at present, so that time and room might profitably be given for a discussion of the broader question of ethical dental journalism, be it trade or otherwise.

Frank Abbott, M.D.

As we go to press with this issue, the sad intelligence has reached us of the sudden death, on April 20, of Professor Frank Abbott, dean of the New York College of Dentistry, in his sixty-first year. An extended notice will appear in our next issue.

Excess of Matter.

Owing to the demands upon our space, several important matters are laid over for publication in the next issue, among which is the report of the First District Dental Society of New York, containing the discussion of Dr. Wedelstaedt's paper published in this number; also several original communications, and reports of dental college commencements, all in type and intended for this issue.

OBITUARY.

Dr. John C. Storey.

Died, Wednesday, March 17, 1897, John C. Storey, M.D., D.D.S., aged sixty-one years.

Dr. Storey was born in Green county, Alabama, in 1836, and his father, Dr. John C. Storey, was one of the pioneers of that state. He was graduated from the Atlanta Medical College in 1857, and practiced his profession in Green county from 1857 to 1860, and then removed to Louisiana. At the beginning of the war he enlisted in the Nineteenth Louisiana Infantry, and in 1862 was discharged on account of ill health. He afterward re-enlisted as assistant surgeon, and from this time to the close of the war he was busily engaged in caring for the sick and wounded. At the close of the war he married Miss Wiley, daughter of Rev. Dr. E. E. Wiley, of Emery, Va. Four children were born of this union—John E., Clarence L., Virginia E., and Theodora J. Mrs. Storey died June 27, 1891, and her remains were interred in Trinity Cemetery. In 1867 Dr. Storey entered the Baltimore College of Dental Surgery, and was graduated in 1869. In 1875 he went to Dallas, Texas, and resided there continuously since that time. He was a member of the Southern Dental Association and of the Texas Dental Association, and had served as president of each of these organizations.

Dr. Storey was a member of the Presbyterian Church, having joined that denomination almost thirty years ago.

He was also a member of Camp Sterling Price, United Confederate Veterans.

The obsequies were in charge of Camp Sterling Price, who attended in a body to do honor to their dead comrade. Judge E. G. Bower and Rev. W. L. Lowrance conducted the burial ceremony.

The pall-bearers were Drs. Thruston and Lane, of the Dallas Medical Association; Drs. Westerfield and Fife, of the Texas Dental Association; and John J. Conroy and Major Wortham, of Camp Sterling Price.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

Dental register of the United States: comprising list of dentists arranged by states, giving post-office address with population and location, date and college of graduation. The various dental societies, dental colleges, a synopsis of the laws of registration, and other laws relating to the profession in each state. Dental journals with names of editors, frequency of publication and subscription rates, and an index to the dentists in the United States arranged alphabetically. Detroit, Baltimore, Chicago, 1896, R. L. Polk & Co., 757 pp. 8°.

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Chauvin. Modifications apportées à la technique de la dent à pivot. Odontologie, Par., 1897, 2. s., iv, 71–77.—Rille. Maladie trophique du maxillaire consécutive au tabes. Ann. de dermat. et syph., Par., 1897, 3. s., viii, 87.—de Roaldes (A. W.) A remarkable case of fibrochondroma of brachial origin (pharyngeal teratoma) removed from the throat of an infant six weeks old. N. York M. J., 1897, lxv, 179–181.—Roberge. La carie dentaire et les affections oculaires. Union méd. du Canada, Montréal, 1897, xxvi, 135.—Rogers (J. T.) Tumors of the upper jaw and their operative treatment. Northwest Lancet, St. Paul, 1897, xvii, 70-73.—Rose (H.) Artificial dentures. Brit. J. Dent. Sc., Lond., 1897, xl, 106–111.—Ross (F. J.) Porcelain work. Dominion Dent. J., Toronto, 1897, ix, 41–47.—Roughton (E. W.) Oral surgery. Brit. J. Dent. Sc., Lond., 1897, xl, 97-106.—Schaeffer-Stuckert. Zahnaufnahmen mit Röntgen-strahlen. Deutsche Monatschr. f. Zahnh., Leipz., 1897, xv, 1–10; 1 pl.—Schenk (F.) Die erste Anlage des Unterkiefers und der Zahnalveolen. Sitzungsb. d. k. Akad. d. Wissensch. Math.-naturw. bl., Wien, 1896, cv, 213–225, 1 pl.—Shands (A. R.) Case of harelip complicated with intermaxillary fissure. Virginia M. Semi-Month., Richmond, 1896–7, i, 647–649.—Silk (J. F. W.) A question for anæsthetists; pneumonia after surgical operations; an anæsthetist's point of view. Lancet, Lond., 1897, i, 804.—Smith (W. P.) Soft gold. Dental Rec., Lond., 1897, xvii, 49–51.—Somers (L. S.) A study of the lingual tonsil. Laryngoscope, St. Louis, 1897, ii, 160–170.—Sparks (R. E.) The dental preceptor. Dominion Dent. J., Toronto, 1897, ix, 87–92.—Stack (R. T.) Touch bulbs in dentine. J. Brit. D. Ass., Lond., 1897, xviii, 92–96.—Sticker (G.) Ein einfaches Verfahren grössere Mengen von Mundspeichel zu gewinnen. München. med. Wchnschr., 1897, xliv, 227.—Swain (H. L.) Some remarks on acute disease of the lingual tonsil. Tr. Am. Laryngol Ass., N. Y., 1897, 24–37.—Szenes (Z.) A fogbetegségek befolyásáról a hallás szervére. [The influence of diseases of the teeth on the organs of hearing.] Gyógyászat, Budapest, 1897, xxxvii, 50–52.—Telschow. Ciment au fluor et a l'aluminium (nouveau ciment dentaire). Odontologie, Par., 1897, 2. s., iv, 1–3.—Thompson (A. H.) Identification by means of the teeth. Dental Cosmos, Phila., 1897, xxxix, 227–232.—Torger. Ein kleiner Beitrag zur Frage der localen Anästhesie. Cor.-Bl. f. Zahnärzte, Berl., 1897, xxvi, 19-23.—Vajna (W.) Papierscheiben-Declinator zum leichten und präcisen Finiren der Contur Goldfüllungen. Deutsche Monatschr. f. Zahnh., Leipz., 1897, xv, 76–81.—Van Woert (F. S.) Compatibility between tooth bone and filling materials. Items Interest, N. Y., 1897, xix, 96–101.—Verstraete. Cinq cas d'abcès péripharyngiens. J. d. sc. méd. de Lille, 1897, i, 193–201.—Wagner (H. L.) Seropurulent maxillary sinusitis in chronic lead poisoning. Tr. Am. Laryngol. Ass., N. Y., 1897, 16–19.—Waldés (J.) Historia de la prótesis dental. Correo Internac. Odont., Madrid, 1896–7, 299–303.—Walton (J. C.) The fate of associations. Dental Reg., Cincin., 1897, li, 10–19.—Waterhouse (H. F.) Tertiary syphilitic perforation of the soft palate. Clin. J., Lond., 1896–7, ix, 315.—Webster (C. P.) The acid treatment of root canals. Items Interest, N. Y., 1897, xix, 107–109.—Weir (R. F.) On the replacement of a depressed fracture of the malar bone. Med. Rec., N. Y., 1897, li, 335.—Wheeler (N. H.) Necrosis of the maxillaires. Welch's Month., Phila., 1896–7, i, 385–387.—Whitehouse (W.) The judicious extraction of the first permanent molar. Brit. M. J., Lond., 1897, i, 521.—Williams (J. L.) A contribution to the study of pathology of enamel. Dental Cosmos, Phila., 1897, xxxix, 169–196.—Wilson (G. H.) Dental legislation. Dental Reg., Cincin., 1897, li, 53–62.—Wood (W. L.) Disease of the antrum. Pacific Stomatol. Gaz., San Fran., 1897, v, 49–53.—Woodhouse (W. B.) Rest. Dental Rec., Lond., 1897, xvii, 52–58.—Wyeth (J. A.) Disarticulation and excision of the lower jaw entirely from within the mouth (without a scar.) Med. Rec., N. Y., 1897, li, 400.—X. Indicacionés y reglas terapéuticas generales en las caries dentarias. Correo Internac. Odont., Madrid, 1896–7, 303–308.

LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MARCH, 1897.

March 2.—No. 577,887, to J. E. STANTON. Dental mallet.
" *16.*—No. 578,729, to J. AUSTIN DUNN. Dental clamp.
" " No. 579,094, to M. C. MERKER. Dental chair.
" *23.*—No. 579 139, to GEO. B. DEARDORFF. Toothpick.
" *30.*—No. 579,785, to S. H. BARTON. Dental chair.
" " No. 79,789, to H. E. HAWKSWORTH. Vulcanizer.

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

CANCER OF THE LIP.

BY C. L. GIBSON, M.D., NEW YORK, N. Y.

ATTENDING SURGEON ST. LUKE'S HOSPITAL, VISITING SURGEON TO THE ALMSHOUSE, WORKHOUSE, AND INCURABLES HOSPITALS.

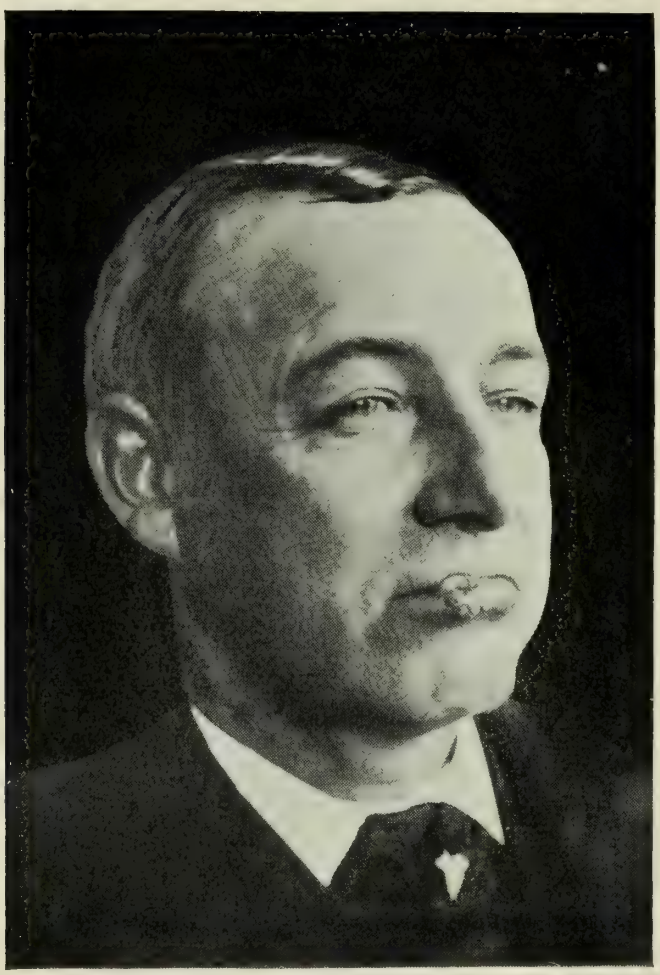
(Read before the New York Odontological Society, February 16, 1897.)

THE treatment of malignant growths throughout the body has of late years been attended with markedly better results as regards the preservation of life. For instance, within a period of ten years the prognosis of cancer of the breast seemed so bad that a most experienced and judicious surgeon raised the question whether we should not better do our duty by our patients by refraining from operating on them, while on the other hand, within a few years, long series of well authenticated cases have been recorded by reputable men with twenty-five to thirty per cent. cures. This happier result has been attained chiefly by two methods, the constant effort to extend the scope of radical operations within the limits of safety and physiological requirements, and the better education of the profession in general to the necessity of early recognition and treatment of such malignant growths. The limits of operative boldness would seem now to have been reached, but much missionary work yet remains to be done in regard to early treatment. The work of dissemination of the knowledge concerning surgical possibilities as well as the limitations of surgery must be undertaken by surgeons, and the treatment of malignant disease will show more favorable results in proportion to their efforts in this direction. Influenced by this latter motive, I have ventured to ask your consideration for this brief study of one form of cancer which is quite likely to be seen by the members of the dental profession before the surgeon is consulted. Cancer of the lip has been in existence on an average a year and a half before professional

advice is sought for it. As a large proportion of persons of this community, certainly the well-to-do class, consult a dentist within that period, I am sure the opportunity must frequently be given to the members of your profession to be the first to recognize the presence of a new growth on the lip.

Cancer of the lip belongs to that class of new growths which are called epitheliomata. These epitheliomata are of two types differing both in their histological constituents and in their clinical course. The superficial form is distinguished by being composed

FIG. 1.



SHOWS BEGINNING ULCERATION.

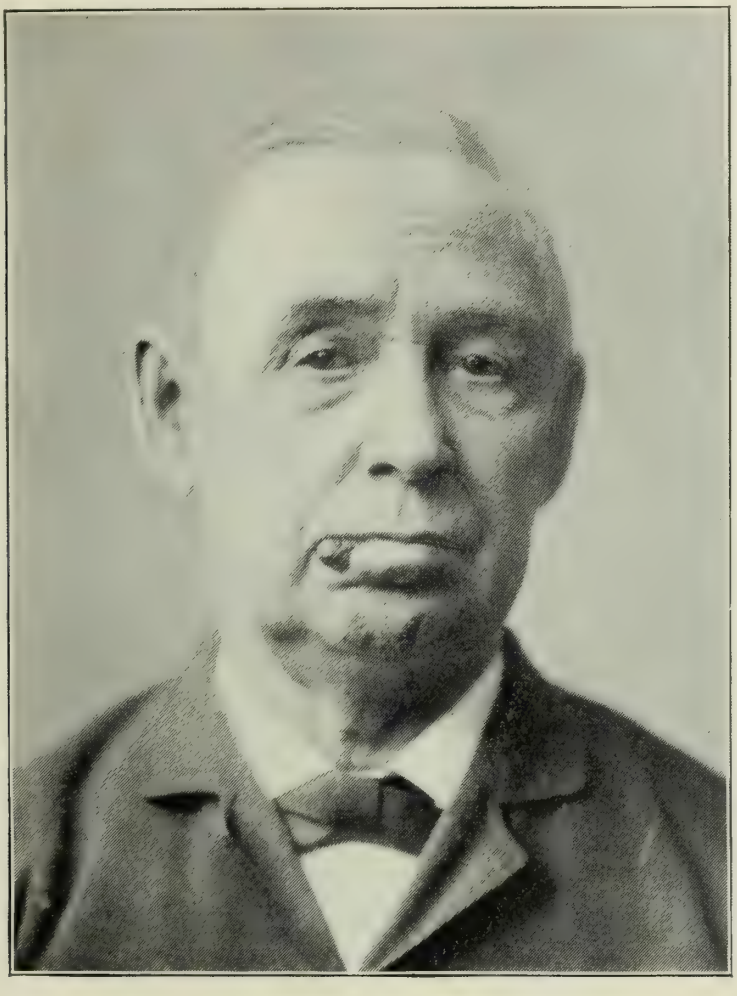
chiefly of small epithelial cells, pursuing a chronic course, seldom being attended with danger to life. It is found almost exclusively on the face, and is now proven to be identical with the rodent ulcer as described by the older authors. The deep-seated variety is the one that interests us, as cancer of the lip is its typical representative. It represents a polymorphous type of growth, and has a tendency to attack surrounding tissues and glands, but is less often the cause of metastatic growths than cancer of internal regions.

The disease, like cancer in general, affects mostly those in advanced middle life. I have found two interesting observations on extremes of age. Gangolphe reports the case of a boy of fifteen

of irreproachable health, from whom he removed a growth of the lip the size of a dime, proven by careful microscopical examination to be cancer. Jalland removed a cancer of the lip in a gentleman aged one hundred and two years, who made a perfect recovery.

The disease up to the present time is essentially a prerogative of the masculine gender. It is hard to say how often it does occur in women. In common with many other surgeons, I have never encountered a case in a woman. When it does occur in the female, the upper lip is more often the seat of the disease, while in men the

FIG. 2.



WART-LIKE FORM.

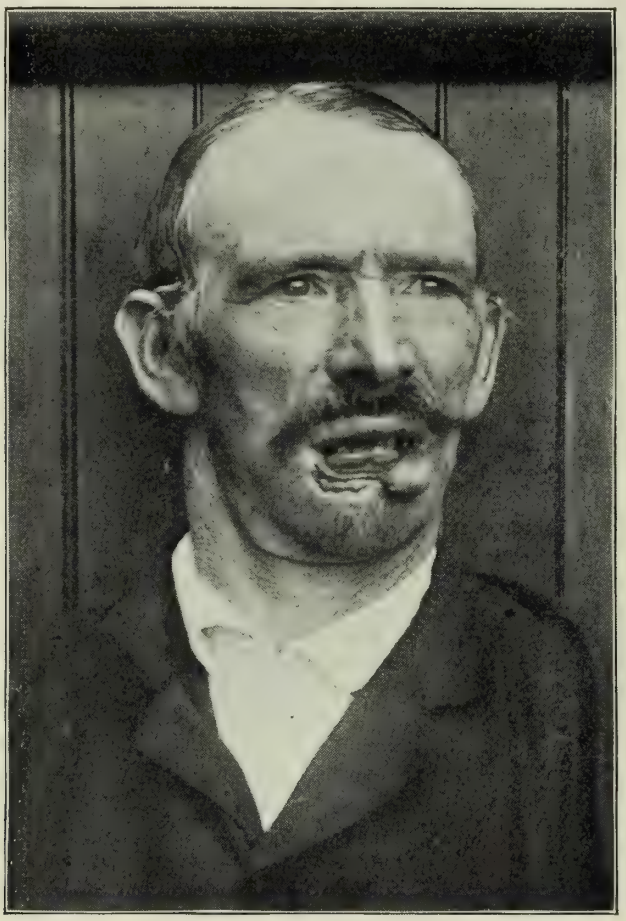
upper lip is affected in little more than one per cent. of the cases. There is no satisfactory explanation why the upper lip should be so frequently attacked, for the mechanical causes held responsible for the origin of cancer of the under lip are, with the exception of shaving, present in both cases.

As regards the causes of the disease, to traumatism in general is assigned the chief place. The lips are so easily abraded, cracked, chapped, burned, and otherwise maltreated that abundant sources of irritation are furnished. Smoking, especially of a clay pipe, must be accounted a factor, as such a history is given in the majority of cases. Still it must be acknowledged that the number of cancers of the lip to the numbers of smokers is infinitesimal.

Winiwarter removed a cancer from the right side of the lip in a pipe-smoker who had always held his pipe in the right-hand corner of the mouth. He presented himself five years later with a similar process on the left side, where in the meanwhile he had been accustomed to hold his pipe, not liking to press on the scar.

As regards the element of heredity, there is an ever-growing tendency to belittle its importance. It is undoubtedly true that the belief in heredity, so strong until recent years, was based to a great extent on tradition. The efforts which we are all making to place medicine on the plane of an exact science discourage the accept-

FIG. 3.



RESULT OF THE APPLICATION OF CAUSTICS.

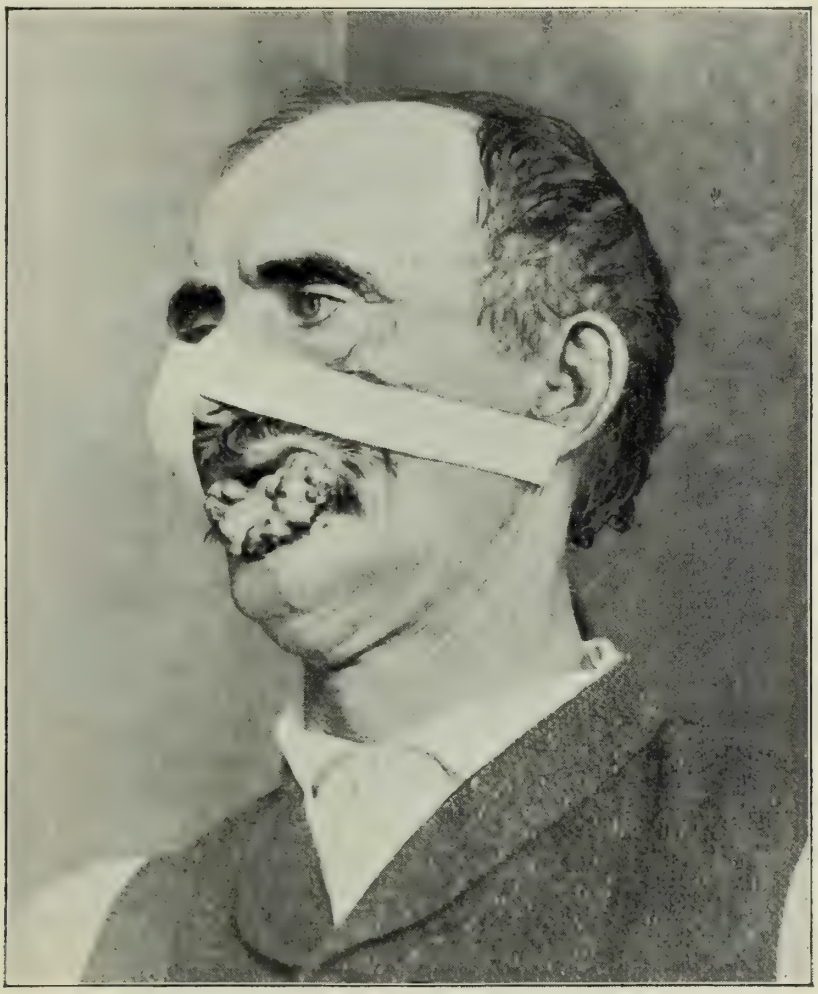
ance of vague histories concerning cancerous relationship; and subjected to an exact scrutiny, the family history of cancer is reduced to so small an extent as to be looked upon by many as only an interesting coincidence. I must acknowledge at this point that in no class of cancerous tumors have I so often encountered such striking family histories of heredity as in cancer of the lip.

At the risk of straying from my subject, I should like to call attention to the recent and rather startling observations that have been recorded of cancer being acquired by living in dwellings previously occupied by the subjects of cancer,—cancer houses, as the term has come to be applied. This is a subject of which the layman may be in a position to obtain information more readily than

the physician, and should be made known in order that we may acquire any possible evidence on the subject that may aid us in combating a disease that has so many helpless victims to its credit.

Cutaneous epithelioma occurs chiefly on the face and head, these localities furnishing the site of eighty-five per cent. of all the epitheliomata occurring on the surface of the body. There are nine points on the face and head recognized as the favorite site of the disease. Of these the lips are attacked in over fifty-five per cent. of the cases, so that epithelioma of the lip, it will be seen, fur-

FIG. 4.



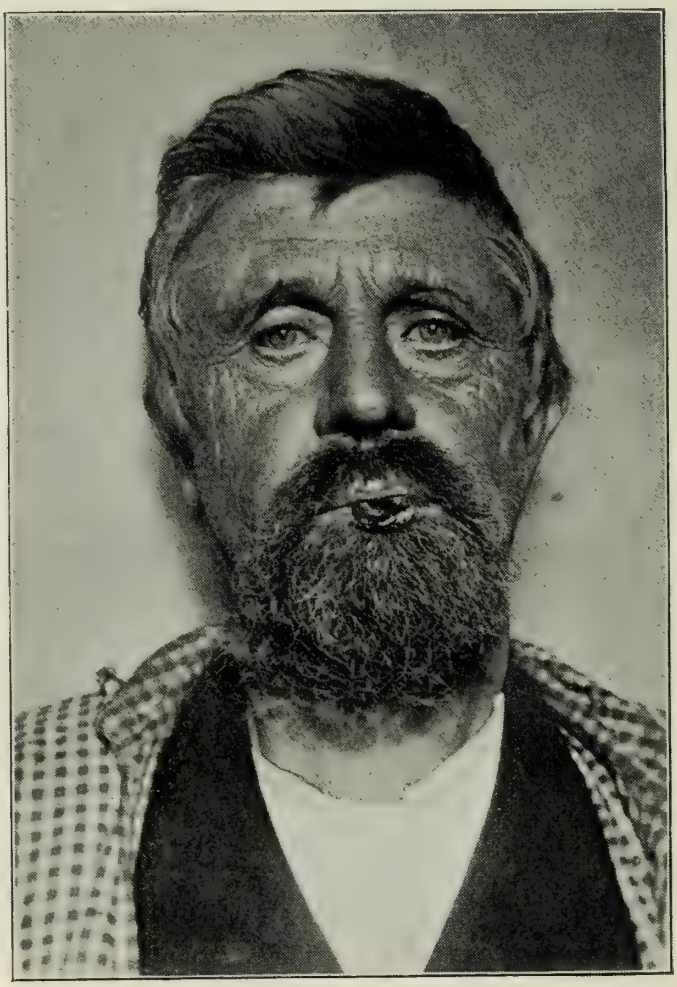
ADVANCED PROGRESS, WITH GLANDULAR ENLARGEMENT UNDER THE JAW.

nishes between forty and fifty per cent. of all the cutaneous cancers, and by its frequency alone becomes an important affection.

Epithelioma of the lip generally occurs on one side of the median line; the left side is rather more often affected. It usually begins as a well-defined nodular thickening just at the junction of skin and mucous membrane. This thickening soon becomes an evident prominence, and can be felt to infiltrate the surrounding tissues. The growth tends to spread toward the surface, where its nature soon becomes apparent. The epidermis is at first preserved; it is generally very thin, smooth, and glistening, and reveals the presence of a net-work of distended capillaries. The surface will

vary; sometimes it has a smooth, oval shape, or it may be segmented or raised up in minute nodular prominences. Its consistence is usually dense, here and there of a cartilaginous feeling, but occasionally presenting areas of softening. The majority begin to ulcerate in the course of a few months, but may not do so for years. The destruction of tissue may either begin spontaneously in the interior of the tumor, or, what is more frequent, the external layer of epithelium is raised by a superficial hemorrhage, and losing its vitality is easily destroyed by the most insignificant traumatism, and the result is a superficial erosion without marked loss of sub-

FIG. 5.



SHOWS ADVANCED ULCERATION.

stance. The ulceration now presents a reddish grandular surface covered with minute areas of hemorrhagic infiltration. Contact with the atmosphere soon results in the formation of a dirty brownish crust which when removed causes a little bleeding; under the crust is a semi-purulent slimy deposit, which in turn dries up and forms a new crust.

When the ulceration starts from within outward, we have quite a different appearance. The central portion assumes the character of a dusky blue swelling surrounded by an area of hyperemia and of edema at the periphery. There is local heat and pain,

softening and fluctuation can be made out, and finally the infiltration breaks down, resembling the development of an abscess. The base is seen sprinkled with small milk white prominences shining like mother of pearl, and an absolute characteristic of cutaneous cancer. The edges are infiltrated and undermined.

When ulceration has once set in there is a rapid increase in growth, and in a remarkably short period of time the entire lip may be destroyed and the adjoining tissues invaded. The nearest chain of lymph-glands are the seat of deposits before any extensive local destruction begins, though they become involved at a much later period in this form of cancer than in other localities or organs, such as the breast. It is usually two to four years before enlargement of the neighboring glands can be detected, but it must be borne in mind that these glands when so recognized are already several times their normal size. The process on the other hand may be marked by evident glandular deposits in three to five months from the first appearance of the disease. Metastases are, however, of great rarity, and when occurring are generally found in near rather than remote organs. Death is therefore rarely due to general manifestations of cancer, but is consequent on exhaustion due to prolonged absorption of septic materials and disturbances of nutrition.

As regards the diagnosis, a typical case can scarcely be mistaken for anything else; the combination of the indolent ulceration and characteristic infiltration shading off into the surrounding tissues without a definite demarkation stamps the condition as epithelioma. Cancer of the lip may be mistaken for a simple wart where no ulceration occurred, or, what is more likely, a primary chancre of the lip, for we know of late years that the occurrence of extra-genital chancres is much more common than is generally supposed. Mr. Treves has given a table of the differential diagnosis that is sufficiently instructive to be given in full.

Chancre.	*Epithelioma.*
Occurs at any age.	Occurs after forty years of age.
More frequently in females.	Almost invariably in males.
Rather more frequently on upper lip.	Almost invariably on lower lip.
Painless.	Often lancinating pain.
Regularly outlined smooth elevation if seen before ulceration has commenced.	Irregularly outlined ragged prominence or ulcer with everted edges.
Induration (if present) distinctly circumscribed.	Induration not uniform, varies in different parts, and is more diffuse.
Induration precedes ulceration.	Induration follows ulceration.
Develops in days or weeks.	May be months in developing.
Implication of a number of glands simultaneously within a short time of appearance of the chancre.	Glands implicated one by one months after appearance of epithelioma.
No perceptible smell.	Smell often offensive.
Secondary syphilides,—*e.g.*, roseola, plaques, etc.	None.
History of exposure to syphilis.	None.
Slight elevation of temperature common.	Temperature normal.
Yields readily to mercury.	Unchanged for better by mercury.

As regards the treatment, there is only one,—thorough excision with the knife provided the condition is still operable. The extensive forms require complicated plastic operations whose technical details I will not inflict on this audience. In the earlier cases, where no glandular infection has occurred, the classical V-shaped excision of the entire thickness of that portion of the lip affected is a very simple and satisfactory procedure attended with perfect cosmetic results, the scar not being visible except at close range, and the rosebud appearance first presented by the mouth soon disappears as the lip stretches. It can be perfectly and painlessly performed under two per cent. cocain anesthesia. The amount of healthy tissue to be removed varies with the extent of the infiltration and the rapidity of the growth. Usually not less than a quarter of an inch on either side is taken away. The chief point of importance in the union of the lip is to secure perfect apposition of the vermilion border. As the parts are rendered anemic by pressure during the operation the recognition is not always easy, and a preliminary study of the peculiarities of the lip's outlines prior to any interference is desirable. The sutures should be of fine silk, and if removed quite early will leave no scar. Caustics should never be employed in treating this form of cancer, and should in general be allowed to become the monopoly of charlatans.

Prognosis.—I can only give a personal opinion, as sufficiently extensive trustworthy statistics of this minor form of cancer are difficult to obtain and somewhat conflicting. It may be said in general that cancer of the lip when removed at an early period of its existence is in a large proportion of cases forever eradicated, but if allowed to gain any headway is seldom amenable to permanent cure by operation. The prognosis differs, however, considerably with the variety of the cancer and with the individual. A very superficial warty growth developing first in advanced life, say after seventy, may persist as such or with very little change during the individual's lifetime, while a cancer in a man of forty that begins to ulcerate almost as soon as it makes its appearance will make such progress that in a year or less its advances are beyond the limits of surgical relief. Of my own early cases treated by the V-shaped excision I have no knowledge of any recurrences, but I must acknowledge that I have only exceptionally been able to follow up my patients for any length of time, as they are drawn for the most part from dispensary or hospital practice.

Many years ago a celebrated German surgeon said, "If called to a patient with strangulated hernia, do not let the sun go down if by day, or arise if by night, before you have given him relief." It is to be hoped that the art of surgery may yet have the power of formulating a rule on such lines for the treatment of malignant disease.

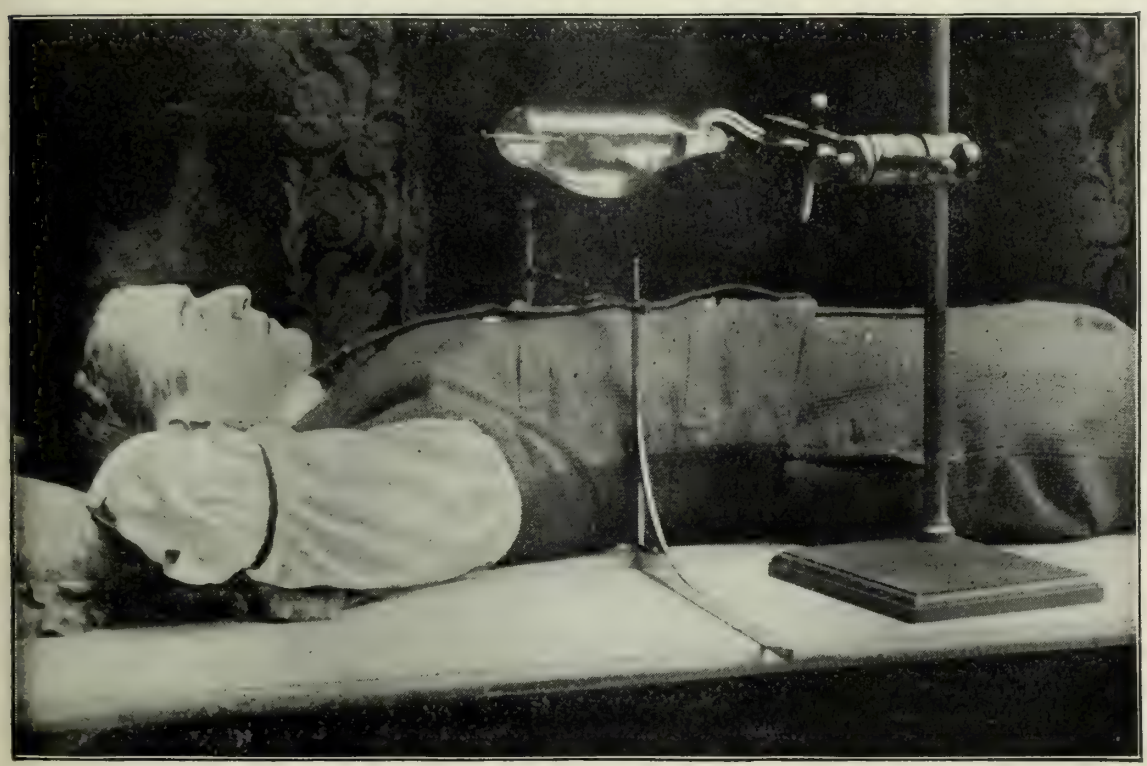
A New System of Measurement in X-Ray Work.

BY JOHN DENNIS, ROCHESTER, N. Y.

(Read before the annual meeting of the Seventh District Dental Society, Rochester, N. Y., April 27, 1897.)

Surgeons will remember how quickly the hope sprang up that the energy, which Professor Roentgen so modestly called the X or unknown ray, might be utilized in aiding the surgeon in the diagnosis of foreign substances, such as bullets, needles, and calculi in the human organism, and the many disappointments which followed its application on these lines. Very early in the history of the X ray I found that it was a very deceptive guide, and that,

Fig. 1.



Lateral Application of Fluorometer to Body.

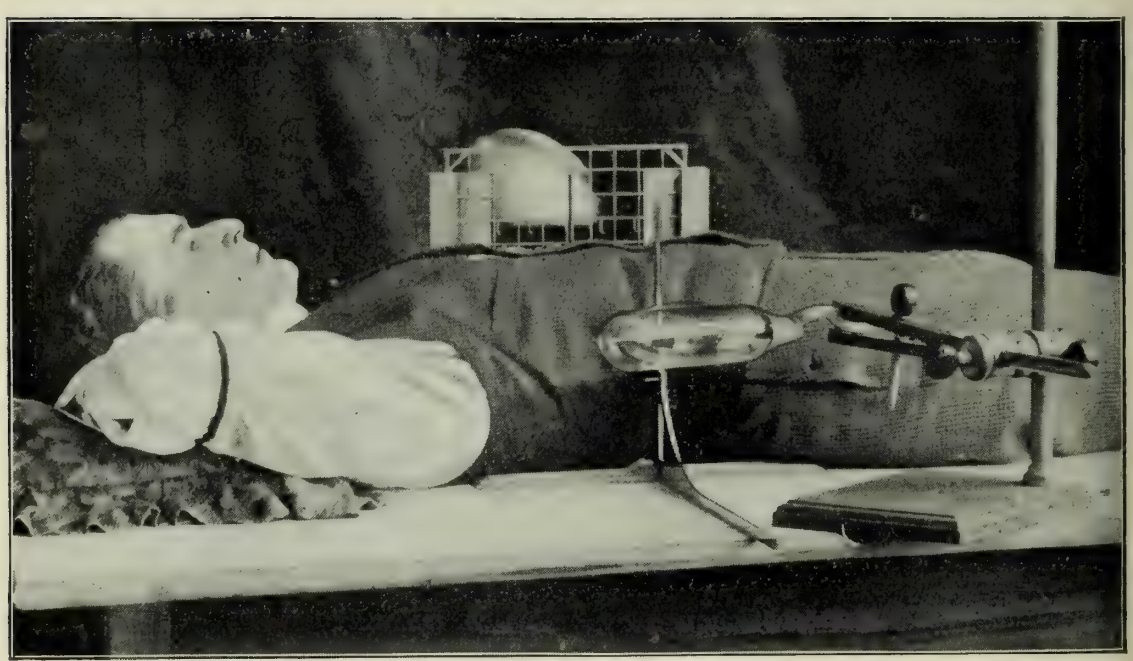
wherever a foreign substance which was less permeable than its surroundings might be, it was certainly not in the position indicated by the so-called radiographs or skiagraphs, and, as a consequence, two views taken at right angles would not disclose the location of the object.

Taking as a starting-point several cases in which exasperating failure had followed exploration made on the strength of radiographic pictures, I determined to endeavor to devise a system and apparatus, if necessary, by which, without pictures, positive and definite diagnosis of impermeable or partially impermeable objects in the human organism could be made, and the result has been the apparatus and system which I have called the Fluorometer and Fluorometric system.

About three months ago, as a condition precedent to certain features of my work, I determined to settle in my own mind the question as to the exact source of the energy, and whether the so-

called X ray was subject to deflection. To accomplish the first result I took two fluorometers identically alike. I first placed one of these fluorometers conveniently over a box and brought the instrument within the parallelism of the rays; in other words so that only a thin, vertical line, identical with the base-line of the fluorometer, showed on the field of the fluoroscope. I then placed the second fluorometer beside the first, and brought that also within the parellelism of the rays, thus producing two parallel vertical lines, something less than one inch apart on the field of the fluoroscope. I placed the instruments at as close proximity to the tube as was practicable. Then, after taking the observation, I measured the distance between the ends of the fluorometer. I found that the ends nearest the tube were one-sixteenth of an inch apart and at the other end substantially thirteen-sixteenths of an

FIG. 2.



VERTICAL APPLICATION OF FLUOROMETER TO BODY.

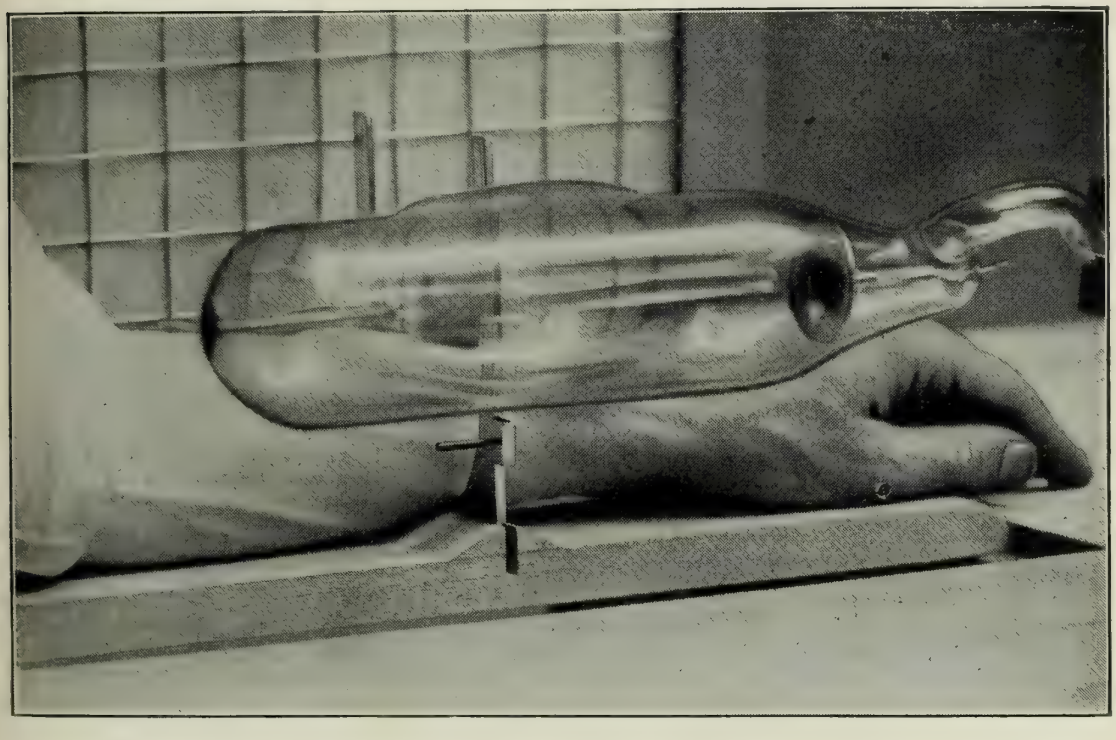
inch. I then placed two similar fluorometers in position, at a wider angle with reference to the first pair, and it required but a simple projection of the lines formed by the sides of the fluorometers to demonstrate that they coincided exactly in the center of the platinum plate, which forms the anode of the tube.

The second experiment was to determine whether the energy could be deflected. Placing a fluorometer firmly in the groove of the table, I brought the instrument into the parallelism of the rays in the manner I have described, the nearest point being removed some distance from the tube. After several careful experiments with a somewhat powerful magnet, I was unable to change the character of the shadow on the fluoroscope.

It was at once apparent to every experimenter that the visible effect of the Roentgen ray, whether in its action on a sensitive plate or paper, or its visual effect on the fluorescent screen, is a shadow, and a shadow only, with all the limitations which the term

implies. In attempting to make practical use of the Roentgen rays in the discovery and location of foreign substances in the human body, I was at once confronted with the fact that this shadow, after the nature of shadows, was treacherous and unreliable. In other words, a positive change in position of the subject would be marked by far less change in the general outlines of the shadow, thus producing a distortion in the picture which added a great element of uncertainty as to the exact location of the object sought, with reference to any points on the subject. Then again, there was the distortion caused by the angle of the rays; for when the X ray once starts it goes straight to infinity. Thus it has happened in many instances that, while apparently a bullet or needle, for instance, was located in a certain position with refer-

FIG. 3.



FLUOROMETER APPLIED TO WRIST.

ence to the anatomy, as shown by a shadowgraph, it would be found that it was not at the place indicated. I need not enlarge upon this branch of the distortion, for it is familiar, not only to every experimenter on the lines of the Roentgen rays, but to every observer of Roentgen ray pictures. As I have shown in experiments to determine the source of the rays, the distortion produced by the angle of the rays is easily corrected when proper appliances are used. For instance, I place a bullet between the two appliances at a point close to the screen of the fluoroscope, or in the other case to the sensitive plate, it will be seen that the distortion from this cause is negligible. Now as I move the bullet toward the source of the energy, the distortion becomes more marked. At the same time it cannot become greater, even if placed close to the tube, than the widest distance of separation of the two angle-pieces. In other words, the distortion in this illustration at one-half of an inch from the tube cannot exceed thirteen-sixteenths of

an inch, and as the object is moved away from the acute portion of the angle, the distortion becomes more negligible.

The distortion of position, however, is more serious. Soon after I began my investigations of the Roentgen ray phenomena I realized that, if they were to be utilized practically in aiding surgeons to locate with certainty foreign substances in the human body, the distortion caused not only by the angle of the rays, but by the position of the subject, must be eliminated. By repeated experi-

FIG. 4.



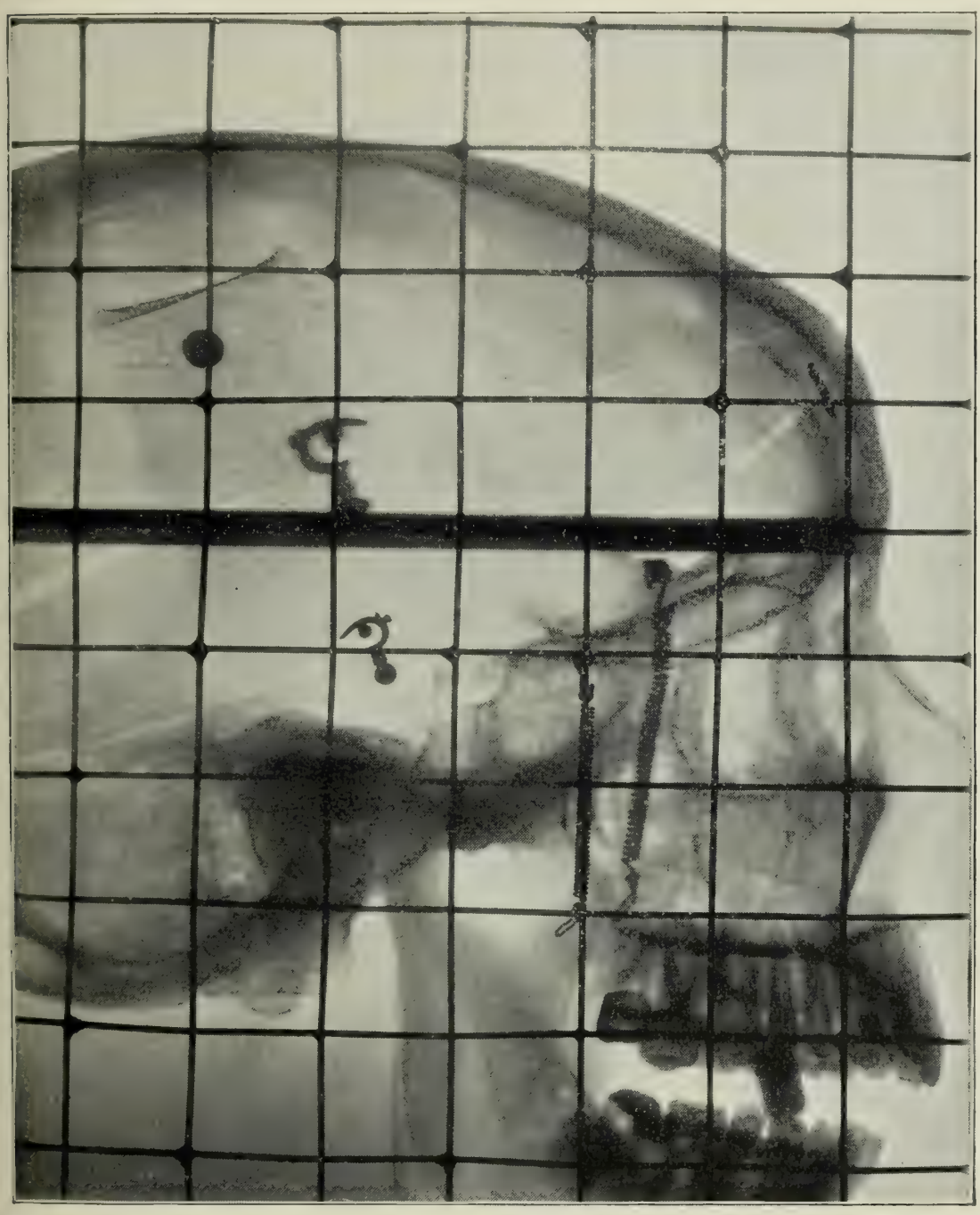
FLUOROMETER APPLIED TO HEAD-WORK.

ments I found that locating a substance in another substance which was more permeable by using right angles was a delusion and a snare, and would remain so until some method could be devised by which the subject could be placed in a certain and definite position, where what we call, for want of a better term, a correct shadow could be thrown, and then, retaining the same relative position, the second angular view be taken. You must remember that we are still dealing with a shadow, which is not only treacherous but is lacking in the dimension of thickness.

Further investigation convinced me that the only practical solu-

tion of the difficulty was to establish a definite cross-section of the subject, by means of angle-pieces, which would be less permeable than any portion of the subject, and which could be made to retain their relative position to the subject and with the parallelism of the rays through the process of producing the angles. Having established this cross-section, which was susceptible of being shown in

FIG. 5.



FLUOROMETRIC RADIOGRAPH OF SKULL, SHOWING BULLET.

its integrity in the shadow, I found it was desirable that it should be formed in close proximity to the foreign object, which had been superficially located by means of the fluoroscope. After long experiments I devised an appliance which would conform in a general way to the shape of the body, the neck, the head, the foot, or the limb, and which would, at the same time, preserve the position of the body squarely in its relation with an adjustable table. This

horse-shoe like fluorometer fits the wrist. Having ascertained the general position of a foreign object in that wrist, by means of the fluoroscope, I place this fluorometer so that it appears to be half an inch or an inch, as the case may be, from the foreign object. Securing the wrist in the interior of this angle-piece I place the appliance, with the wrist in a groove in the table, thus squaring with the table. Then observing with the fluoroscope the operator adjusts table, angle-piece, and wrist, until the arms of the fluorometer are directly in parallelism with the rays, indicated by the fact that only the straight vertical line which I have before explained is shown on the field. Then, by means of the fluoroscope, the grating of an inch or less mesh having been placed coincident with the angle-piece, the process of measuring from the cross-section produced by the angle-piece is but the work of an instant. You have then ascertained that the foreign object is located one-half an inch or more, as the case may be, from a cross-section of the wrist, indicated by a line drawn between the lines of the angle-piece with iodin or India ink.

Whether, however, that foreign substance is located on one side of the bone or the other side of the bone, on one side of the wrist or the other side of the wrist, is still a mystery. Now, retaining the subject and fluorometer in the same position, the open side of the fluorometer is closed by an appliance for that purpose. Then, leaving the subject and fluorometer in the original position, the source of energy is placed above instead of at the side of the subject. Observing with the fluoroscope beneath the table (which is arranged with an aperture for the purpose), table, subject, and fluorometer are adjusted until the added side of the fluorometer and its opposite are brought within the parallelism of the rays, and the second angle is obtained.

You have thus the data by which is ascertained not only the cross-section of the wrist in which the foreign substance is located, but the distance from one side of the wrist to that foreign substance also, by means of the second angle.

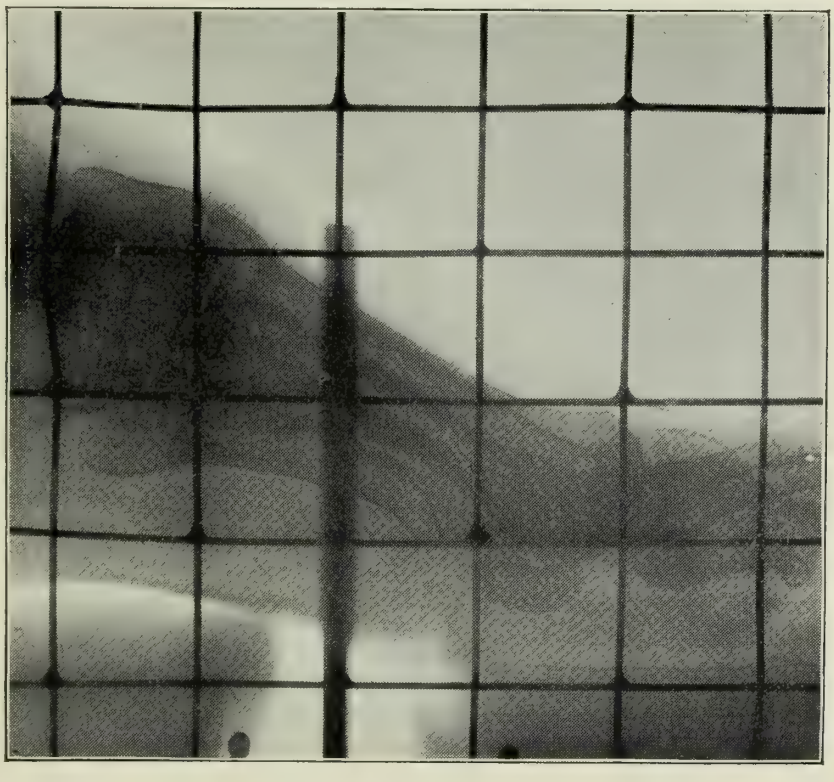
In the case of a bullet in the brain cavity, elements of uncertainty of location, having in view the desirability of a possible operation for its removal, become very grave. After what has been said about the nature of the Roentgen shadow, it requires no argument to show that a very slight variation of the position occupied by the head will produce a distortion which would preclude successful exploration.

You will see at a glance that it is impossible to determine in which side of the head the foreign object shown is located. Again you have the shadow, and the shadow only, without the dimension of thickness. If, however, the cross-section of the skull—the desirable position having been obtained—is established by means of the fluorometer similar to the one used on the wrist, one of the angles and measurements can be obtained with absolute certainty. Then again, as in the case of the wrist, if the skull is brought, with its angle-piece and metallic pins, again within the parallelism of the rays, and a second right angular observation taken, the exact

placing of the bullet in that cross-section is a matter of simple measurement on the exterior of the skull.

Just here I will be met by the statement that, even now, we have remaining the element of distortion caused by the rays, in both of the lines forming this angle. That is true, and unless that objection could be met, the assertion that the measurement is exact would not be strictly correct. As I have shown in the experiment with the source of the rays, the extent of this variation, with the fluorometric system, is ascertainable in every case, and we are enabled at a glance to rectify this angle. The fluorometer is provided with adjustable metallic pins, which are susceptible of being placed anywhere on the appliance. In making an observation, the fluorometer is brought somewhat closely to the foreign object. The metallic pins are placed at an equal distance from the base-

FIG. 6.



VERTICAL FLUOROMETRIC RADIOGRAPH OF FOOT.

line of the fluorometer, and the subject and table and instrument so adjusted that the pins and foreign object are in "range," or technically speaking, in parallelism with the rays. We have thus thrown an absolutely undistorted shadow on the field of the fluoroscope, and can measure its distance from known points and lines on the subject by means of the wire grating, and we have already established exactly the cross-section of the subject in which it is located. In taking the second observation (or if desired the second fluorograph), the metallic pins are again placed; again the range is found and measurements made from a point on the fluorometer, which remains constant during the process of adjustment.

From the beginning of my investigation of the Roentgen rays,

it has been the object of my endeavor to devise a method of aiding surgeons in their diagnosis, by the use of the fluoroscope, and without waiting for the slow and very unsatisfactory process of radiography.

Primarily it is the object of the fluorometer to so arrange the superimposed subject that what may be called a perfected or symmetrical shadow of the subject will be thrown upon the fluoroscope screen, and retained in its integrity until proper measurements have been made, and until, if necessary, a fluorograph is produced by means of the sensitive plate.

Secondly, it is not only desirable, but absolutely necessary, the correct position having been obtained, and the perfected shadow

FIG. 7.



LATERAL FLUOROMETRIC RADIOGRAPH OF FOOT.

having been thrown upon the screen, to eliminate the characteristic distortion produced by the rays, to ascertain by means of this shadow, which is without the dimension of thickness, the relative position which any impermeable object, say a bullet or a needle, occupies with reference to the surface of the superimposed subject. Such is the work of the fluorometer.

In the matter of the differentiation of calculi from bone or tissue in the human body, I am in what the diplomats call a waiting and expectant mood. I early demonstrated the absence of difficulty with the fluorometer in establishing an abdominal cross-section of the human body, and fixing, with absolute certainty, the location of any object which was impermeable to the Roentgen ray. In my experiments with calculi, specimens of which have been placed in

animal tissue, my experience has been very peculiar. I have placed certain specimens of calculi in the most difficult positions, and have found those specimens clearly discernible, not only upon the sensitive plate when developed, but the field of the fluoroscope; so plainly indeed, that their exact location could be determined. At the same time I have placed other specimens of calculi, which to my unpracticed eye were in no wise dissimilar from the first mentioned, in the most favorable positions, without satisfactory results. My collaborator, Mr. W. W. Hibbard, and myself have begun a series of experiments with the fluorometer with calculi, which, with the aid of my surgical friends, we intend shall be determinate. We have made some satisfactory progress; progress which leads us to hope for a measure of success. The results are not such, however, as to yet warrant their announcement. I hope speedily to make a report, based upon these experiments, which will render the diagnosis for calculi and their location in the different organs of the body very satisfactory. As most of you are aware, the heart and liver can be, by means of the fluoroscope, differentiated from the remaining tissue. The differentiation of tumors offers a field of investigation which is very suggestive, but so far as I am aware no definite and certain results have as yet been obtained.

It is only within a comparatively short time that I have had an opportunity to even examine the field afforded to the oral surgeon by the Roentgen rays. My researches have been in an entirely different direction, but at the same time, frequent examinations of the skull and head have suggested to me that the field is one which is worthy special, and even exclusive investigation. By means of the fluorometer, shadows of the head and its different parts can be produced upon the fluoroscope screen and the sensitive plate, with the head placed in any position which is desirable for this special investigation of the teeth. Through the kindness of a professional friend, we are enabled to show to-night a varied and somewhat interesting collection of the results of operations on the teeth. It will be understood, of course, that it is not my province to intrude upon the work of the dentist, any more than it is my province to intrude upon the work of the surgeon. It is only in so far as I am enabled to present a perfected shadow upon the fluoroscope screen or sensitive plate and make the necessary measurements with the distortions eliminated, that I can offer any suggestions to the oral surgeon. I am frank to admit that the field is a difficult one, but all investigations on lines of the Roentgen shadow are beset with difficulties. If I were a dental surgeon, the very difficulties which present themselves would spur my ambition for investigation.

I have been much interested in the last few days by the process of a dental surgeon who has utilized flexible film, placed in the mouth, for producing sectional views of the teeth and the jaws. I am as yet just a little puzzled to know what he means when he says that he utilizes the energy by means of "pipes," but I suppose I shall learn that as I study the subject further. I have only had time for limited experiment with the flexible film in the interior of the mouth, but I am satisfied from those few experiments that,

with skill and care, very satisfactory results may be obtained. Divesting his process of the to me unknown "pipes," I find that results can be obtained in this way. Supposing in the case of this skull it is desirable to examine the front teeth in the upper jaw. All that is necessary is to procure the sensitive paper as it comes in its envelope with black covering and, with due precaution under the ruby light, cut a sheet of paper, envelope and all, into the desired shape, carefully closing the cut edges again with the black cover paper. These pieces may be cut into any desirable shape, such as a crescent or square of any size. Then placing the flexible paper or film back of the portion of the jaw which it is desirable to reproduce, it is only necessary to fix the head in the desired position and make an exposure of five or six minutes. The little envelope with its film is then taken to the dark room, the film developed and fixed, and the picture, a positive, is complete. I am not sufficiently familiar with oral surgery to express an opinion as to the value of the method. Perhaps if I had had the "pipes," the result would have been more satisfactory.

Again through the kindness of professional friends I have secured several cases of abnormal conditions of the teeth and jaw, and as rapidly as time will permit these cases are being critically examined by means of the Roentgen rays. As in the case of calculi, I hope to be able a little later to report some interesting facts regarding these cases.

My endeavor, in a modest way, has been to make certain that which was uncertain, and from the standpoint of a layman place within the reach of the surgeon an instrument and method potent, as I believe, for the saving of human life and the alleviation of human suffering. If I have, in any measure, succeeded in this endeavor, then the many hours which I have stolen from the little leisure afforded by my professional work to devote to this object will not have been in vain.

Notes on the Numerical Variations of the Teeth in Fifteen Peruvian Skulls.

BY GEORGE A. DORSEY, PH.D.,

ASSISTANT CURATOR OF ANTHROPOLOGY, FIELD COLUMBIAN MUSEUM, CHICAGO, ILL.

In the March issue of the Dental Cosmos* I described and figured a skull from near Cuzco, Peru, which was marked by the congenital absence of the upper pair of lateral incisors. Since that paper was written other material from the same region has become available, and I have made an examination of the skulls with a view of determining whatever of similar interest might be found in the condition of the teeth. The result is even more interesting than I had anticipated, for out of a total of fourteen skulls eleven are distinguished by some anomalous character. In all

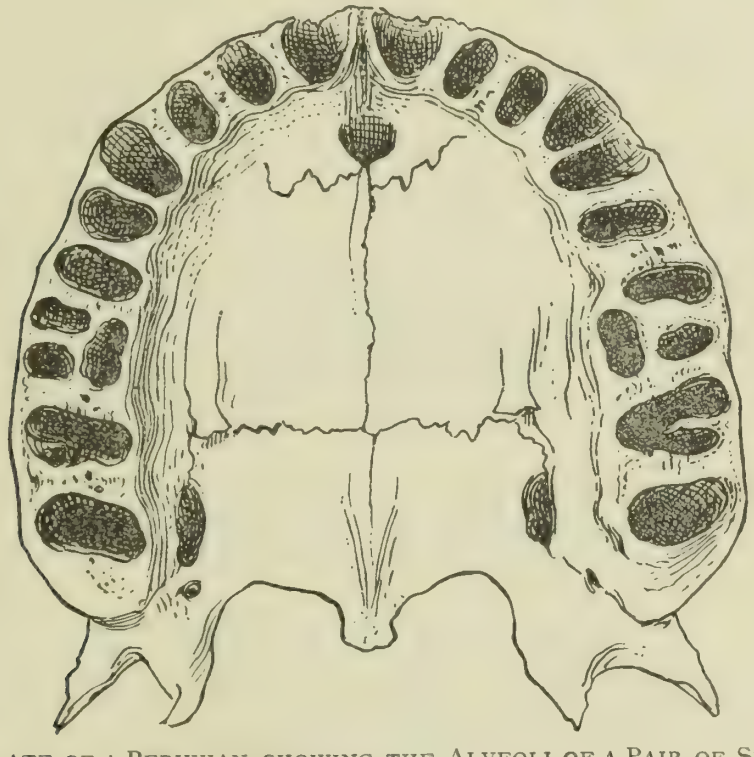
*P. 213. "A Peruvian Cranium with Suppressed Upper Lateral Incisors."

of these fourteen skulls the teeth are either present or the alveoli are open, so that the number of teeth originally present can readily be determined. The teeth as a rule are in sound and healthy condition, in good alignment, and are very little worn. In three of the skulls there was nothing of special interest, the teeth all being of the normal character. I copy from my notes the following observations about the other eleven:

No. 40,283.—Skull of male. Upper lateral incisors much atrophied, less than half the size of the inner pair. Second molars tricuspidate, third molars suppressed. Teeth of lower jaw normal.

No. 40,424.—Skull of male. Upper lateral incisors diminutive in size. Lower left lateral incisor suppressed.

No. 40,425.—Skull of male. Upper lateral incisors very small. Second molars quadricuspid. Third molars have two roots.



THE HARD PALATE OF A PERUVIAN, SHOWING THE ALVEOLI OF A PAIR OF SUPERNUMERARY TEETH IN THE INCISOR REGION. (Natural size.)

No. 40,420.—Skull of male. Lower jaw missing. Third molars suppressed.

No. 40,405.—Skull of male. Lower jaw missing. Root of third molars single and of small size.

No. 40,412.—Skull of female. Upper third molars have four roots; cuspidation very indistinct. Lower third molar has four roots, but the two anterior are blended.

No. 40,411.—Skull of female. Lower jaw missing. Third molars suppressed. Broad diastema between the left first and second premolars.

No. 40,407.—Skull of male. Upper third molars suppressed. Lower third molars erupted.

No. 40,278.—Skull of female. Lower jaw missing. Upper third molars suppressed.

No. 40,410.—Skull of male. Upper left third molar suppressed; others erupted.

No. 40,419.—Skull of female (see cut). The teeth have all been lost, but none of the alveoli are absorbed. This specimen is of unusual interest, for it presents the very rare condition, a supernumerary pair of teeth in the incisor region. It is greatly to be regretted that these teeth are not present, in order that their character might be more fully determined; but we can only judge of that by the empty alveoli. As may be seen in the figure, these are of the usual incisor size and character, and in perfect alignment. The left alveolus, however, is a trifle smaller than that of the left second incisor. It may also be noted in the figure that the premaxillary suture persists to a considerable extent, but whether the suture originally terminated between the second incisor and the supernumerary tooth, or between the supernumerary tooth and the cuspid, it is now impossible to determine. Indeed, the evidence presented by the two sides is not quite the same, for on the left side the suture persists to a greater extent than on the right, and seems to be directed for its termination to the space between the second incisor and the supernumerary tooth.

For the frequency and signification of supernumerary teeth in this region special reference may be made to the paper of Professor Sir W. Turner in the *Journal of Anatomy and Physiology*, 1885, on "The Relation of the Alveolar Form of Cleft Palate to the Incisor Teeth and the Intermaxillary Bones," and that of Windle and Humphrey in the same journal, 1886, on "Man's Lost Incisors."

To sum up: We have in the fifteen skulls (including the one previously described) the following anomalous conditions:

No. 40,283. Upper lateral incisors atrophied; third molars suppressed.
No. 40,424. Lower left lateral incisor suppressed.
No. 40,425. Upper lateral incisors weakly developed.
No. 40,420. Third molars suppressed.
No. 40,405. Root of third molar of small size.
No. 40,412. Upper third molar has four roots.
No. 40,411. Third molars suppressed.
No. 40,407. Upper third molars suppressed.
No. 40,278. Upper third molars suppressed.
No. 40,419. Supernumerary pair incisors.
No. 40,280. Upper lateral incisors suppressed.

THE CLINIC.

BY E. P. BEADLES, D.D.S., DANVILLE, VA.

OCULAR demonstration is the best teacher. When a child sees a thing he will remember it easier than if only told about it. Men are simply grown-up children. A desire to learn something new is the foundation upon which all of our dental associations rest. The clinic has been the favorite method of imparting knowledge.

Many men attend the annual meeting for the clinic alone. They can read the papers and discussions in the journals; but cannot see the operations. This being true, the very best methods for conducting clinics should be devised. It is evident that the plans which have been in use by most of our societies have served their day. With a small number present, each man may be able to see what is going on; with a large number present nobody gets any satisfaction, the operator is crowded and worried, often failing to do himself justice.

The idea should be, not to have so many clinics, not so many operators; but good ones. Some men can teach, others cannot. There is a secret in being able to impart knowledge, to explain a thing so that the hearer may go home and perform the thing for himself. If those who have our clinics in charge for this year will select a few good men of known experience as operators and with ability to tell what they know, and will carry out the following rules, success will be theirs.

1. Have provided only one chair, and have that placed upon a raised platform near the president's seat.
2. Have only one clinic in progress at one time.
3. Let the society be in regular session during the clinic, with the president and other officers in their places.
4. Let each operator furnish beforehand to the manager of the clinic a list of whatever he needs to carry out his work.
5. Have placed on the platform a good blackboard.

Now with the members in their places the clinician is introduced and his intended operation announced. With the patient in the chair and with free use of the blackboard, he explains fully what he intends to do. At a certain time those who wish to examine the case are allowed to come up, one or two at a time; this over, the operator proceeds with his work. If it will consume some time another subject may be taken up by the association, business transacted or a paper read, with the understanding that the operator can have the attention of the members whenever he desires it.

We are not students at college, and do not need to see all operations right through in order to be able to do them; a suggestion, an illustration, an explanation may be all that is needed in many cases, or a question asked and answered when all can hear at once. The manager will be able to do his work with greater satisfaction, having only one clinic on hand at a time. By the old plan he is at the beck and call of every operator, and is wanted in a dozen places at once. But possibly the most important point covered by the adoption of this plan will be the effect upon the operator. As it is now, good men often refuse to clinic, well knowing the difficulties under which they must labor. The operator knows that at best he can only explain his method to a few, and perchance the man next to him may be showing something very novel, and has the "crowd." The first operator has spent time and trouble to get ready, and is showing something really valuable, but there is no one to see it. He completes his case in silence, steals off out of sight wishing "he hadn't."

By the plan here outlined no one who has been invited to clinic will be neglected. He will have the ear of the entire association, he will feel stimulated to do his best, and knowing this will prepare his best. Our prominent men will feel it worth their while to accept invitations to clinic, everything will be done orderly and "satisfaction guaranteed."

Aristo-Paraffin Wax for Root-Canals.

BY HARRY B. HICKMAN, D.D.S., PHILADELPHIA, PA.

The paraffin obtained from petroleum or by distillation of cannel coal, or wax containing sufficient stearine to raise its melting point above the temperature of the human body, will answer for the purpose here described. That obtained from petroleum is preferable, because less subject to chemical alteration and therefore less liable to develop irritating qualities. It also for the same reasons remains permanently aseptic.

The average druggist can tell, approximately, the melting point of the wax he sells, which will generally be found sufficiently low for the purpose intended.

Mix the aristol and paraffin by application of slight heat and by means of a spatula till the mass assumes a dirty straw color. This mixture will not deteriorate with age, and can be kept in glass or in a pasteboard box. Paraffin wax as found in commerce is a more or less impure hydrocarbon, but it will not volatilize unless raised to a high temperature.

After the dam has been applied and the canal has been sterilized and prepared as usual, it should be desiccated thoroughly by use of chloroform or alcohol with hot-air syringe, or by use of a root-canal drier. When this has been accomplished, roll a cone of aristo-paraffin and place in the canal, and with a heated root-drier or other pointed instrument touch the wax, when it will fill the canal by capillary attraction.

When the canal is filled, to all appearances, the material can be forced up through the apical foramen by means of a round-head burnisher and a pledget of cotton or bibulous paper, or by twisting cotton around the sharp point of a plugger, when by the slight irritation evinced by the patient for the instant it will be known that the canal is filled. Experiments with this preparation on extracted teeth demonstrate through what surprisingly minute foramina it can be forced.

The advantage of using aristo-paraffin, where the foramen is large, is that, if it is forced through the foramen, it will not produce sufficient irritation to cause or continue an abscess, but be absorbed by the tissues, which advantage can hardly be claimed, righteously, for any other filling of the same value in other respects. When the canal is thus filled the bottom of the cavity should be covered with cement, and the filling completed as conditions indicate.

Between sixty and seventy cases of abscessed roots have been

treated and filled in this manner, from one to three years' standing, and there has been but a single case of recurrence of apical tumor, which was caused by an impacted third molar.

Eight months ago, in examining a lady's mouth, the lower second molar, which was filled with amalgam, was found to be abscessed. According to her story there had been a fistula on her gum below the tooth for nine years.

In cleansing the root there appeared through the fistulous opening a substance resembling what the pathologists term blue pus, which made me hesitate about trying to save the tooth. Instead of extracting, the filling was removed and the canals treated in the usual manner with carbolic acid, creasote, oil of cinnamon, etc., but the fistula remained closed for a few days only. Finally it was decided to fill the root-canals and treat the abscess through the fistula. In forcing aristo-paraffin through the distal canal, there appeared through the fistulous opening, on the point of wax, a particle of amalgam, which had been causing the whole trouble.

After filling the crown as much paraffin as possible was removed from the fistula, and in a few days it closed up. Since then there has been no recurrence of either pain or fistula.

Management of Pulp-Canals.

BY S. ESCHELMAN, M.D., D.D.S., BUFFALO, N. Y.

(Read before the Eighth District Dental Society of New York.)

In considering any subject relating to dentistry there is none which furnishes a larger field for discussion, is more interesting and important, than the management of the pulp-chamber and root-canals. Important, because many of our difficult and tedious operations depend for success on their proper treatment; and if indifferently done, the work is liable to entail suffering on the patient and dissatisfaction with the dentist.

There are two distinct conditions of the pulp-canal that call for treatment: First, the cases in which the pulp is living and has to be removed; second, the cases in which the pulp has died and left the chamber and root-canals in a putrescent state.

In destroying the living pulp, two methods present themselves: the immediate and the slow. The immediate method has given me the most satisfaction, and is performed by the use of ethyl chlorid and carbolic acid. In using the chlorid of ethyl tubes, I prefer those with the curved nozzle, as by their use the spray can be directed on to the exposed pulp, whether situated on the mesial or distal surface of the tooth. Before using the ethyl chlorid, it is necessary to protect the tissues surrounding the teeth by rubber-dam or napkins from the intense cold it produces. After the tissues are well protected, I direct the spray on the exposed pulp until it is so anesthetized that the patient manifests no pain from the extreme cold of the spray. Then a nerve-broach, on which a few strands of cotton have been wound very loosely, so as to carry as

much carbolic acid and occupy as little space as possible, with one quick thrust is pushed to the apex of the canal, so as to amputate the pulp at the apical foramen. It is surprising with what little pain the pulp can be removed in this manner from the ten anterior teeth. I prefer carbolic acid on account of its anesthetic and antiseptic properties; it also arrests the hemorrhage quickly.

In using the second or slow method, arsenious acid, made into a paste with acetate of morphin and cocain, appears to act as well as any combination I have used. In its method of application, with regard to safety and ease of applying, I prefer to place a small particle of the paste on a slab, then with a spatula I work it into a small pellet of cotton. Then make a cap or cup of air-chamber metal and smear its concavity with a solution of Canada balsam or sandarac varnish, so as to have the pellet of arsenic adhere to the cap, and we have an application that can be easily managed.

I suppose we all have had cases where the arsenical application oozed out of the cavity and produced more or less destruction of soft tissue. Especially is this liable to happen in approximal cavities, where the decay has extended below the gum-margin. In these cases it is best, before applying the arsenical pellet and cap, to seal up the cervical margin of the cavity with a pellet of cotton saturated with sandarac varnish. This with care can be done so that the cotton lies against the gum and leaves a pocket around the exposed pulp. Then the cap containing the application is placed in position over the exposure, and the cavity sealed without danger of displacement.

Other cases in which the metal cap and arsenical pellets are extremely satisfactory are shallow cavities, especially those at the cervical margin of the bicuspids. The cap and pellet is placed in position, then a pledget of cotton saturated with sandarac varnish placed over the cap, after which a ligature of floss silk is passed around the tooth and over the application, and securely tied to prevent its displacement. By passing the ligature twice around the tooth, the first loop will hold the application in place while the knot is being tied.

Again, in making the arsenical application great care should be taken to avoid pressure, as it has been my observation that in most of the cases where pain follows the application, it was due largely to the pressure of the dressing. By making the metallic cap of sufficient size to form a bridge over the exposure, pressure is avoided. Since I have used these caps, I find it the exception to have pain following the arsenical application. While there is no particular harm in leaving the application for several days or longer, I prefer to see the patient in twenty-four hours and remove the application, as I desire to have a remedy that is capable of doing harm removed as soon as possible. The cases are extremely rare in which the pulps are not dead or so nearly dead that if the arsenical application is removed and replaced by an antiseptic dressing, and left for a few days, nature will do the rest.

If it is desirable to remove the pulp after the first application and some tenderness remains, it can generally be removed with

little pain by using cocain or carbolic acid, or, what I prefer, cocain in sufficient carbolic acid to dissolve it. In treating the second condition, or those cases in which pulp-chamber and root-canals are in a putrescent state, it is well to begin by first opening the pulp-chamber freely, so as to gain access to all the root-canals. After this has been done and the loose débris washed away with warm water, the canals are next to be cleansed of all dead pulp or other septic matter. For this purpose I know of no medicament equal to hydrogen dioxid. For convenience' sake I fill a hypodermic syringe with the dioxid, using a curved needle with a blunt end, with which I drop sufficient of the dioxid into the cavity to fill the pulp-chamber. Then with a Donaldson broach I gradually work the liquid into the canals to the apex, and as the dioxid comes in contact with the septic matter it is converted into froth, which is to be washed out and renewed by fresh liquid. This process is to be continued until the bubbling ceases and the dioxid remains clear. It is surprising how quickly and efficiently the dioxid acts on the putrescent matter. From its first introduction, when it forms large bubbles, and as oxidation of the septic matter gradually grows less, minute bubbles keep coming to the surface and after a while cease, until it leaves the liquid clear, what a transformation has taken place, from a foul-smelling pulp-chamber to one that is bleached and has no disagreeable odor!

The next stage of the operation is to carefully dry the canals with cotton twisted on a smooth broach, which will dry the canal sufficiently for practical purposes; but if you wish to be more particular, cleanse the canal with absolute alcohol, then evaporate the alcohol with a hot-air syringe or a root-canal drier, when the pulp-chamber and root-canal will be in a splendid condition for the permanent antiseptic dressing.

Before speaking of the permanent dressings, I wish to say a few words in reference to an objection which has been urged against hydrogen dioxid as a pulp-canal cleanser, and that is the danger of forcing septic matter through the apical foramen during the gas-forming stage. Now in those cases not complicated with an abscess, a glance at the anatomical formation of the tooth and pericemental membrane will show that this cannot be done unless the broach is rudely forced through the foramen, as the peridental membrane is closely in contact with the tooth and fills the entire space at the apical foramen, so that in all cases free from abscess there is no cavity into which the gases may escape.

Again, if a blind abscess does exist, we find that the apex of the root is denuded by its peridental membrane and projects into the sac, so that a pocket exists around the sides of the apex. In such a case it would even be desirable that the dioxid should pass through the apical foramen, and sometimes it is necessary to force it through to disinfect the sac, in order to effect a cure.

When the pulp-canals are ready for the permanent dressing, we have a number of efficient medicaments that can be used,—viz, the oils of eucalyptus, cassia, and cloves, and carbolic acid, creasote, iodin, nitrate of silver, and bichlorid of mercury. While all of

these remedies are efficient, some of them, such as bichlorid of mercury, iodin, and nitrate of silver, are objectionable on account of the discoloration of the tooth-tissue, and if used at all should be confined to the posterior teeth.

After the pulp-chamber and canals have been freed from septic matter and placed in an aseptic condition, the next stage of the operation will be to so leave the canals that after the cavity is filled it will insure a permanent operation. The universal practice is to fill the root-canals and pulp-chamber. The more perfectly this has been done the more satisfactory the operation is supposed to be.

Before considering the different methods of filling the canals and the different and indifferent substances used for filling, let us consider the science or philosophy of canal-fillings. Now what is the motive for filling root-canals, and does the generally accepted theory hold good? I believe the general idea for filling the root-canals is to so close the apical foramen as not to allow any of the nutrient fluids of the body to gain access to the canals, and by so doing cause them to become septic.

Do fluids enter the root-canals and pulp-chamber in a normally formed tooth after the wound at the apical foramen caused by the wound of the pulp has healed? I believe they do not; if such were the case, how is it that when an application of cotton saturated with a medicament is placed in the pulp-canals and allowed to remain for a time, it becomes perfectly dry? If liquids enter the canals, should not the dressing have been moist instead of dry? What has become of the moisture in the cotton? Capillary attraction and exosmosis must have carried it through the dentinal tubuli into the circulation. Now, if nature will remove moisture placed in the root-canals, why will it not do so if some of the lymph of the body enters through the apical foramen? Again, what would be the objection to allowing the healthy lymph, which is aseptic (provided the pulp-chamber proper be hermetically sealed, so that no bacteria or other deleterious agents could enter the root-canal from the mouth), to enter the root-canals to be again taken into the circulation through the tubuli and lymph-channels in the cementum, to the peridental membrane?

Again, would it not be rather beneficial to have a free interchange of lymph, and would not the tooth be better nourished by such an interchange? If we refer to the anatomy of a tooth, we will find two governing laws at work to carry moisture out of the root-canals: capillary attraction, and the law that fluids in motion attract moisture. These two conditions are furnished by the dentin and pericemental membrane. The dentin cannot be looked upon as a solid body, but one made up of myriads of parallel straight tubes. Outside of the terminal ends of these tubes, we have a moving stream in the circulation of the pericemental membrane. Now for the sake of discussion let us allow that the moisture does enter the apical foramen; it would spread itself out on the walls of the root-canals; capillary attraction of the dentinal tubuli combined with the flowing circulation of the pericemental mem-

brane would carry it into the tissues outside, and we would practically have a circulation of healthy lymph. As I understand it, healthy fluids in motion are not what we are afraid of, but fluids which are stagnant or motionless. Let us theorize on a canal that has been thoroughly filled. If we bear in mind that the dentin is made up of tubes, by hermetically filling the pulp-canals we seal up the pulpal ends of the tubuli and reverse capillary attraction, and the fluids that enter the tubuli will be held and become stagnant on account of the tubuli becoming closed tubes by the filling. To illustrate, if a tube closed at one end be attached at the other to a current, the air will be sucked out and a vacuum will be formed; and as a vacuum will not exist under such conditions, liquid will be sucked back and permanently held.

While I still fill all root-canals as perfectly as I can, I state it as my positive conviction that the process is not necessary for the successful preservation of the tooth. In support of my belief, I wish to cite the case of a lower molar in my own mouth, where the pulp was removed twenty years ago and the canals left free, which never gave me a moment's discomfort until a month ago, when caries under a filling penetrated the pulp-chamber, which led to the discovery that the root-canals were not filled. I have come across other cases where the root-canals were not filled and were doing good service, when other conditions made it necessary to enter the pulp-chamber. Again, if filling the canals to the apex is necessary for success, our successes would be small indeed, as I am convinced that it is the exception in back teeth where they are perfectly filled.

I do not wish any one to get the idea that since I state it as my belief that the root-canals do not require filling, it means careless treatment. On the contrary, it is necessary to be more particular to cleanse and treat the canals than when some forms of filling-materials are used, such as liquid gutta-percha and zinc oxychlorid, which in their fluid state can surround and imbed particles of pulp-tissue so as to render them inert.

In reference to the methods and materials used in filling the canals, time will not allow nor would it be beneficial to mention more than a few of the many kinds in vogue, as many of the materials used go to show that if the pulp-chamber and root-canals are in a perfectly aseptic condition they will tolerate almost anything. The materials most in vogue for filling are cotton, gutta-percha, and zinc oxychlorid. Cotton, while it has at present some prominent advocates, I believe to be a bad material to use as a permanent root-filling. So long as it will retain the antiseptic medicament it is all right, but when it loses the medicament it is one of the worst materials for absorbing moisture and undergoing decomposition. Especially do I condemn the methods that some operators practice of sealing up the apical foramen with a pledget of cotton and filling the remainder of the root-canals and pulp-chamber with zinc oxychlorid or gutta-percha. If there is a point where cotton is objectionable, it is at the apical foramen, where it will be in contact with moisture. As this point is the seat of alveolar abscesses, cot-

ton if placed there willfully furnishes a nucleus for bacterial infection in the center of an abscess-forming area. In filling with gutta-percha, it is essential to have the canals as dry as possible, so that the dentin will absorb some of the chloroform, which will allow the gutta-percha to form a more intimate union with the walls of the canals.

When the root-canals are ready for filling, instead of filling the canals with chloro-percha and then taking up the excess of liquid with solid cones, it is my practice to first moisten the canals by means of cotton twisted on a nerve-broach and dipped in chloroform. Then the gutta-percha cones are held with a pair of pliers, dipped in chloroform, placed in position in the canals, and with root-pluggers worked toward the apex. Often to complete the operation it is well to warm the pluggers, so as to soften the last layers of gutta-percha. In oxychlorid of zinc we have an excellent material for filling root-canals, on account of its antiseptic properties and strong affinity for water. Some of the preparations sold are not good for this purpose, as they set too quickly. It should set slowly, so as to allow time to place it in the canal.

In filling with oxychlorid of zinc absolute dryness is objectionable in an ideal filling. On account of its strong affinity for water, moisture should be left in the tubuli. In preparing the oxychlorid for filling it should be mixed quite thin, about the consistence of thin cream, then with a smooth broach some of the mixture is carried to the canals and gradually worked toward the apex by an up-and-down movement, and if done properly so that the root is well filled and the air all out, the filling will be capped at the commencement of the root-canal. After the canals have been filled with the thin mixture, it can be hardened by twisting cotton on a broach and absorbing the moisture, then working a thick mixture into the filling.

CORRESPONDENCE.

Employment of Dentists in the United States Army.

To the Editor of the Dental Cosmos:

Sir,—In the Dental Cosmos for March, I note Dr. Arnold's article on the employment of dentists in the United States army. I take considerable interest in this subject, as I have been several years in the service, and know pretty much its needs in this respect.

Our military service would certainly be much benefited by having dentists regularly appointed and stationed at the larger garrisons. But, in order to get anything of this kind established, the subject should be properly brought to the notice of "the powers that be" through professional societies or congressional representatives. I imagine that if all dental societies would combine with an effort, and work through their representatives in Washington, it would surely have a great influence in bringing about the establishment of a position, beneficial to "us poor soldiers" in particular, and to the military service in general. Prior to 1887

there was no Hospital Corps in the United States army. There was the hospital steward, to be sure, but he was not appointed for his knowledge of medicine, surgery, etc., but principally to oversee or manage the hospital, especially the culinary department, and to do a little ordinary dispensing. The nurses were detailed from the different troops or companies composing the garrison. They were detailed for a few weeks, or possibly months at a time; but their stay was never long enough for them to become good, intelligent nurses.

In 1887 the hospital corps was organized, and to become a steward under the new system one must pass a satisfactory examination in materia medica, pharmacy, hygiene, minor surgery, first aid in emergencies, hospital administration, etc., the examination being decided at the surgeon-general's office, in Washington, D. C. Nurses and other attendants, being permanent members of the hospital corps, are trained in nursing and general hospital work until they become thoroughly efficient in their duties.

The advantage of the new over the old system can hardly be summed up. The surgeons are relieved of a great amount of hard work, while the sick soldier gets the very best, intelligent nursing. In short, the establishment of the hospital corps was one of the best things ever enacted for the military service.

Now, why not do at least one more good deed for the service by establishing the position of dental surgeon?

The government gives its soldiers splendid quarters, good clothing, and furnishes food excellent in quality and quantity, but does not furnish teeth to chew it with, should those they have give way.

An applicant for enlistment must have good, sound teeth, especially molars, or he is invariably rejected; even the front teeth being broken down by decay is a good cause for rejectment. Our sick reports very often show cases of old soldiers diagnosed as "indigestion," "dyspepsia," etc., which the condition of the teeth probably explained, and many days' service have been lost to the government by its soldiers, directly due to decayed teeth.

We have veterinary surgeons in our army to care for horses; why not dental surgeons to care for teeth? The position of veterinary surgeon is a good one, and the government derives much benefit from it. Now, the soldier is a government man, and the horse is a government horse; would not the preservation of the teeth of the former be as beneficial to the government as the general carcass of the latter?

Soldiers cannot always go to a dentist, even though they always have the ready money to pay for their work. Take for instance some of our frontier garrisons, where there is not a dentist located within fifty miles or more of them, and one probably does not make a visit to the post once in a year; a soldier has an attack of genuine, old-fashioned toothache; it may be a good tooth, one that should not be lost by any means; probably with a few hours' work it could be made nearly as serviceable as ever. But there is no dentist near, and he cannot endure that pain until one comes, probably in six months, possibly longer, so what can the poor fel-

low do? Nothing but go to the hospital and have it extracted by the steward, and, if the steward is successful in getting it out, the man is relieved of his pain, but he is just one more tooth short; but if it happens to be broken off, and the worst part of it left in the jaw, a condition which very often prevails, the man is worse off than before. In this way thousands of teeth are lost, and eventually there must be many days' service lost to the government, resulting therefrom. Even when soldiers are stationed near cities where dentists are plentiful, they often have a hard time getting work done. The busy dentist must make engagements according to his time, while the soldier, not knowing what duty he may be detailed for, cannot make engagements two days in advance.

Why not, then, have dental surgeons in the army, and make the position equally as good as that of a first-class veterinary surgeon, with a distinctive uniform, if a uniform is required at all; give them quarters in or near the hospital, with an office room in their quarters, where every man in the service of the government could have his teeth properly attended to. The government would certainly not be the loser by it.

It might be urged that the hospital stewards be required to study dentistry and do this work in connection with their hospital duties; but, having had considerable experience in both lines, I can say that the steward who performs his duties as he is supposed to has quite enough to do, while there is enough dental work in each of our larger garrisons to keep most any one dentist busy, and if he had to make regular visits to the smaller posts he would not have much time to go fishing.

Our government formulates rules for gymnastic exercises and general athletic sports (which are excellent in every detail for developing both muscle and lung power), and it insists on these exercises being carried out. Now, take the man whose digestion is seriously impaired, caused by a bad condition of his teeth, will this increased exertion be beneficial or harmful to him?

The human body (and the body of a soldier is human) has, by eminent men, been likened to a machine, which must be kept in good repair to be serviceable. Our government keeps its machines in excellent repair with the one exception, the teeth. Now, take for instance your dental engine; keep all parts clean and in good condition, except the hand-piece; pay no attention to that, just leave it alone; how long will your engine remain in a serviceable condition? It is very obvious that the hand-piece, having no care, will be the first part to become unserviceable; and when it does, what service can you expect of the other parts of the machine till you get a new hand-piece?

So it is with the soldier; what service could be expected of him when he becomes debilitated from the breaking down of a part of his mechanism, his teeth, with no means of repair within his reach?

Very truly yours,

MURRAY ACKLIN,

Assistant Hospital Steward, U. S. A.

JEFFERSON BARRACKS, Mo., April 28, 1897.

PROCEEDINGS OF SOCIETIES.

First District Dental Society, State of New York.

The First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, February 9, 1897, at the New York Academy of Medicine, No. 17 West Forty-third street; the president, Dr. John I. Hart, in the chair.

Dr. Arthur L. Swift, chairman of the Clinic Committee, read the following

Clinic Report.

A clinic was held this afternoon in the society's room at the Academy of Medicine. Dr. E. K. Wedelstaedt, of St. Paul, Minn., demonstrated his methods of cavity measurements. Dr. T. D. Shumway, of Plymouth, Mass., filled an anterior approximal cavity in an upper left bicuspid with gold and tin in combination, and also filled out of the mouth several cavities demonstrating his method which he will fully describe in a paper this evening. Dr. W. L. Mason, who was to have exhibited his detachable porcelains for crown- and bridge-work, telegraphed that he was unable to be present.

On motion "Incidents of Office Practice" was passed, and Dr. E. K. Wedelstaedt was called upon to read his paper entitled "A System of Measurement of Teeth and Some Ideal Cavities." It was accompanied by a number of charts in illustration.*

Discussion.

Dr. J. F. P. Hodson. I am delighted with anything that tends to refinement and delicacy of operation, and it seems to me this does, to a certain extent. I am quite in consonance with it and in favor of it, but in some respects it seems to me the essayist is rather over-enthusiastic, as is every man who brings out a new proposition. I should probably be the same were I in the same position. He spoke of surgeons and physicians doing their operations in a very exact way, and in contradistinction to the way in which we do ours. I think he is, to put it very mildly, a little over-enthusiastic in that statement. Their basis is their anatomical knowledge, and upon this is reared their superstructure of judgment and skill, but they do not work with millimeters in performing their operations. I certainly do not wish in the least to belittle this work of the essayist, but am decidedly of the opinion that a man's education, his judgment, his delicacy of touch, and his "horse-sense," if I may so say, are of infinitely more value than any cast-iron rule that may be laid down for him by millimeter gauges, because there is variation in the structure of the tooth, in the position of the pulp and its horns, in the age of the patient and in the quality of the teeth, and all those things have to do so largely with the case in hand that it seems to me these minute

*For the paper in full, see page 375 of the Dental Cosmos for May.

measurements are of comparatively little practical value to the dentist in his general operations. I can understand perfectly where these measurements would be of infinite value to students who were making examinations and studies in different parts of the country for their communication with one another, or for instruction in colleges. There are many ways in which they would be very valuable, but for a man in regular and full practice to have to stop and apply and record these measurements seems to me so unjustifiable a strain upon an already overstrained life that I would rather saw wood than practice it. I am inclined to think that judgment and prudence and environment are also to be taken into consideration as to how far and how quickly one can move teeth. It depends very much on the patient also. I quite fail to see how millimeters can help us here. As to the identification of patients, I think I could identify positively the patients for whom I have done operations, and with my records make oath if necessary to such identification. It seems to me that supposing those measurements to have been taken of cavities before they were filled, and the filling showing a totally different aspect, as we all know, by overlapping gold, etc., how can an individual retake those interior measurements on the cadaver of the individual he is endeavoring to identify? He could not do it without taking out the filling, and how can one take out a perfect filling without disturbing the margins very seriously?

In a general way we must prepare our cavities as we must, and not as we would. Ideal cavities are always before one in the air—rarely in the mouth. I am a firm believer in gentleness in operating. I am so firm a believer in that, that I feel justified at times with over-sensitive patients in compromising with some of these ideal conditions. While I recognize perfectly the value of the removal of buccal and lingual margins of approximal cavities in order that the touching approximal surfaces shall be gold instead of tooth-substance, I recognize also with a sensitive patient that it would mean a very heroic operation to cut these margins back, and, under such circumstances, would not be justifiable. It would be better, and the patient would a thousand times prefer it, to fill the cavity as it stands, and after a few years refill it if necessary, rather than slashing away so much tooth-substance and cutting new holding-points in solid, very sensitive dentin. The same thing would apply to the bottoms of the occlusal cavities mentioned by the essayist. I should not take great pains to get a flat floor in an occlusal cavity. I would be glad to have it, if it would come so, but I would not make very strained endeavor to produce it.

A very valuable point that Dr. Wedelstaedt did not say quite so much about as he ought, is that this system has discovered to us an ability to excavate to greater depth in posterior approximal cavities and yet not reach the pulp, than we can do mesially, because the pulp lies nearer the mesial surface. This seems a very valuable point and of very real consequence.

Dr. S. G. Perry. I was unfortunate in not being able to get here until after the paper was commenced, so I have lost much of

it. The doctor comes to us with the breezy quality of the West that I admire very much. About twenty years ago I went over this ground, and at that time I advocated opening up cavities more freely, so they could be treated with straight instruments as much as possible. I have a little more reverence for the natural teeth to-day than I had then. I cut more freely then than I do now. I look upon the principle of caulkage as of great use in the saving of teeth. Of course decayed dentin should generally be removed—though not all of it, always. Dr. Williams's recent paper illustrated the truth of that. But I think it more important to caulk the teeth at the edges of the cavities so the germs will not get in in armies, or even in Indian file. I should like to see plastic materials used that would be durable, but I do not think I shall live to see the day. Then those glistening gold fillings that stare us in the face all over the country would be unnecessary. Our modern system is going rather too much in the direction of severe cutting, and then, as a necessary consequence, there must be hard work to restore what is cut away. It will make the teeth more secure, in a certain way, but I think as Dr. Hodson said, it is better in good teeth at least to keep the cavity as small as possible, and then fill it again if necessary. It never may be necessary. I do not mean to condemn this system unqualifiedly, nor the writer of the paper, because I have seen some of his work, and I have only unqualified admiration for it. He is to be classed with Varney and Webb in that respect. I think the "putty" principle, however, very carefully applied, has an element of great strength, because it is so beautiful, and so gentle, and it saves what is so beautiful in the human mouth,—the natural teeth. I think it is wise to try to make the edges of approximal teeth just free, so the edges can be seen when you look closely for them. I cannot believe that it is wise to often cut any more than that. The general principle of caulkage I should apply as much as I could. I hate to even look into a mouth and see gold. There are some features about Dr. Wedelstaedt's drawings that I cannot get accustomed to. I do not like the angular points. I prefer the curved lines, in conformity with the cavity. Many of these cavities I would not fill with gold throughout. I would fill them with oxyphosphate, and put a thin veneer of gold over them, and get perfect safety in that way. I think the system of measurement is all right if one has the time to give to it, but I do not think it of such great importance as does the author of it.

Dr. SIDNEY S. STOWELL, of Pittsfield, Mass. There is no question but what the ability of the doctor to measure with such fine detail, the exact size of every cavity, is in the direct line of science; but whether we can put it to practical use is a little doubtful to me. When the machinist fits a "pulley head" to a shaft, he uses his millimeter gauge to measure and fit it accurately; but we do not see any two cavities alike, and do not fill any two alike. I shall go right on using my own rule in every case. The man who is born a dentist, a mechanic, with an intuitive conception of force and resistance, will prepare a cavity instinctively so it will have strength

in proportion to the resistance that is required. To the person who lacks that intuitive sense it might be valuable to measure more in detail. One man may be able to take two sticks of wood or iron, and put them together, and tell by intuition just about how large the stick or iron should be to give the support required of it; while another man might require exact measurements. In such a case, the millimeter and the scientific problems of tests of strength would have a practical bearing. In regard to the preparation of cavities and cutting away the margins, we people in the East have for many years been accustomed to preparing our approximal cavities so as to make the margins self-cleansing, and some of us who knew the late Dr. Webb received valuable instruction which has gone out to the world, so that his soul goes marching on. It seems rational that the margins of approximal cavities should, as far as possible, be cut to make them self-cleansing. Gold upon gold will not decay, if we have been reasonably careful. In regard to the subject of thorough excavation of cavities, I propose at your next meeting to demonstrate that we can do a vast amount of good for suffering humanity, and still leave a large amount of leathery decay in cavities while Nature repairs the damage which the microbes have done.

Dr. W. W. Walker. I think we ought to be very grateful to the doctor for coming from the West and giving us this interesting paper. While I do not wholly agree with his entire system, there are some things which I think might be very beneficial to the dentists here. I think as Dr. Hodson said, the easiest, the gentlest way is the best. I hardly see how a busy man could do it, but it seems as if the measurement of cavities is something we should take into consideration. This is the first time that I have heard the subject presented in such an exact way, and I shall provide myself with a set of these instruments.

Dr. S. L. Goldsmith. The essayist spoke of extending cervical edges so that they are just covered by the free margin of the gum. Does it make any difference as to where the decay extends? Suppose the decay extends only half-way between the cervix and occlusal surface?

Dr. Wedelstaedt. Are you speaking of a tooth by itself, not having the adjoining teeth?

Dr. Goldsmith. With the next tooth in position.

Dr. Wedelstaedt. I prefer to have the margin covered with healthy gum-tissue.

Dr. Perry. You would not make a small approximal filling so large as to go under the surface of the gum?

Dr. Wedelstaedt. The age of the patient would have to be taken into consideration. I should not take a child eight years old and attempt to work for it as I would for a person twenty-two years old. We must look at these things from that light.

Dr. Perry. If I understand Dr. Wedelstaedt, I protest against the practice of cutting small cavities in teeth of fairly good structure until the cavity goes under the gum on the approximal surfaces of bicuspids and molars. If there is softness and decay, that

is another matter. But I still think I misunderstand him. Surely he cannot mean to say that he would carry all approximal cavities under the gum.

Dr. Nelson T. Shields deprecated the mutilation of teeth by too extensive cutting. He believes in removing only sufficient enamel to insure the thorough removal of carious dentin, and then fills the cavity with non-cohesive gold, a substance which he considers one of the most compatible with tooth-structure and the best filling-material for saving teeth. He attributes the comparative immunity from decay of the lower incisors to the constant action of the alkaline saliva and the movements of the tongue, whereby acid ferments are neutralized. The systematic use of alkaline preparations and disinfectants can be depended upon to preserve the good structure adjoining a perfect filling of gold in other locations in the mouth.

Dr. Wedelstaedt. There are two things that have been spoken of in discussing this paper to which I wish to call your attention. First, the refilling of cavities; second, so shaping approximal cavities that the free margin of the gum will cover any filling placed within their walls. About nineteen years ago I had a disto-occlusal cavity in a lower left second bicuspid, and a mesio-occlusal cavity in a lower first molar filled. These cavities have since been refilled sixteen times, and those two cavities have cost me over $480. I desire the cavities in my own teeth filled but once. I do not care for any second operation, nor do I care how much tooth-substance is sacrificed, nor how large the cavity is cut, so the instruments that are used are sharp. I have tabulated the results of the measurements of the fifty cavities that were kindly prepared for your inspection by the gentlemen mentioned. You have the average size of each series, with the largest and smallest.

Some one asked a few moments ago what the size of an approximal cavity should be to have the gum cover the filling at the gingival margin.

Let us take the mesio-occlusal cavity in this upper molar. The difference between the largest and smallest is readily seen. The amount of enamel left in one case between the cementum and the gingival margin of the cavity is .5 millimeter. The gum would cover the filling at the gingival margin in that case, but here is one where three millimeters width of enamel has been left between the cementum and the gingival margin of the cavity. The gum will not cover the gingival portion of any filling placed within that cavity. I have observed these cases with great care, and you will find that there is a recurrence of decay in about two and a half years in the great majority of cases. Dr. Webb advocated this same practice in 1881, and in 1891 Dr. Black in his article says, "These are the correct principles." We cannot all be of one mind, as Dr. Perry says. He protests against cutting cavities toward the gingivæ, so the filling will be covered at that portion with the free margin of the gum. I should rather cut and shape my cavities in that way so the filling will be protected with healthy gum-tissue at the gingivæ, than I should to refill the cavities in many cases.

We spoke of treating teeth in comparison with the treatment that physicians give their patients in cases of typhoid fever, malarial fever, and measles, and the similarity of treatment by different physicians in different parts of the country. A physician is called to see a patient, and administers one-eighth of a grain of morphin. Perhaps under the same conditions, had another physician been called, he would have administered one-fifth or one-sixth grain. These are standard principles. I hold that if we are ever going to have a standard system of dentistry, we should have principles corresponding with those of the physicians. We should not have the differences this table of cavities shows. These cavities ought not to be an entire millimeter difference in size. We should have some standard system, so the practice of the East would more nearly correspond with that of the West. As I said before, many men many minds. We cannot all think the same.

Discussion closed.

Dr. T. D. Shumway, of Plymouth, Mass., read a paper, entitled "Gold and Tin as Tooth-Filling Materials," which, owing to the lateness of the hour, was not discussed.*

Adjourned.

B. C. Nash, *Secretary.*

New York Odontological Society.

A regular meeting of the New York Odontological Society was held on Tuesday evening, February 16, 1897, at the New York Academy of Medicine, 17 West Forty-third street, New York City; the president, Dr. William Carr, occupied the chair. The secretary read the minutes of the previous meeting, which were duly approved.

Report of Clinicians.

Dr. J. H. Hanning. About a year ago I had a patient who wanted a bridge. When I examined his mouth, I found that in grinding I would expose the pulps, as the teeth leaned so much. I finally concluded that a dovetail set parallel with one of the piers would fill the bill. I followed out the idea and have been successful. I made one for a fellow practitioner with the same result. I have here a model of the bridge. It shows what can be done by placing a dovetail parallel with one of the piers. The dovetail is made of two pieces of platinum held closely together and bent to shape, which can be done over an old excavator-handle, with a pair of pliers. The dovetail is set parallel to one of the piers and waxed up. Then it is invested in sections, removed from the model, taken apart and soldered in sections. If that is done carefully, you will find it can be placed in the mouth without trouble.

Dr. H. W. F. Cady. A number of years ago I was called in to treat a case of fracture. The physician whose case it was suggested that the teeth be wired. We wired the jaw, and the wire

*The paper is printed in full at page 391 of the Dental Cosmos for May.

became loose from absorption and pressure upon the teeth. I devised a splint that I have used ever since, and in the last few years I have had a large number of fractured jaws to treat, sent to me by physicians and surgeons. It consists of a loop swung around the teeth and made to fasten with a bolt. The teeth are padded up with pink gutta-percha. It prevents the movement of the teeth. The splint can be tightened every day with a watch key. Every jaw I have treated in this way has united rapidly. I had a case sent to me from one of the large hospitals, which had been treated with plaster, Barton bandages, for six weeks with no success. I put on my splint and in three weeks we got firm union. I had always thought that a jaw was never fractured at the symphysis, the most frequent point being just in front or back of the canine eminence, or where a tooth has been extracted. However, I met three cases of fracture at the symphysis in one day. One I did not treat; another I treated and was enabled to remove my splint in five days. The other was a case of Dr. Robert T. Morris's in the Post-Graduate Medical School. It was a case complicated with a fracture of the femur. The patient wore the splint for six weeks, and it refused to unite on account of the fracture of the femur, the larger bone uniting at the expense of the smaller. That is probably due to its stronger selective power. I had a case with splint in situ, of which I tried to get an X-ray photograph, but the patient was uneasy and moved, and the photograph was spoiled. I generally have two or three cases on hand, and I will try to show you some at the next meeting with the splints in position. Another case shown at clinic was a syphilitic necrosis case. The patient had contracted syphilis about five years ago, and had been under irregular treatment since that time. He supposed he had been cured, but about three or four months ago he developed a necrosis of the upper jaw. He came to me, and there was quite a large sequestrum and the teeth were loose. I operated on him under ether, and removed the sequestrum and teeth, and he is now doing well. I packed the cavity with gauze, and it is rapidly closing. It opened into the floor of the nose, but I anticipate a complete closure.

Dr. G. W. Weld. Those of you who were here at the clinic in October recollect that I had a patient here who had an upper right first molar with three root-canals and a bicuspid with two root-canals, instead of one, filled and disinfected at one sitting. There was more or less pericementitis. Those five root-canals, all of which were putrescent, were filled by me in twenty-five minutes by the watch. The young gentleman was here this afternoon, and those who were at the clinic and saw the case had an opportunity of seeing it again. That is about all I have to say in regard to the matter now.

Incidents of Office Practice.

Dr. E. S. Gaylord, of New Haven. At Saratoga last summer, Dr. Waters, of Baltimore, handed me a bottle containing about half an ounce of fluid. Upon explanation, he told me it was a

gold-plating fluid, and told me to take it home and try it. It proved very satisfactory to me, especially in plating wire appliances that I use for regulating teeth after the Jackson method, or plating instruments that may suggest themselves to any of you. You can plate your syringe tip, or your mirrors, or your pliers, or anything you like, with gold. It stands perfectly well, and you can place as much or as little on the surface of the metal as you like, and I see no difference in its taking effect, either on piano-wire, or brass, or German silver. The instruments come with the material. It is furnished and prepared by a man named William J. Pohlman, Woodbrook Post-Office, Maryland. The expense of a two-ounce vial is two dollars and a half. Just about how much that would plate I cannot state. I plated nearly everything I had in the office that I could plate, and I still have a great deal left. If you have a regulating appliance, for instance, it can be plated with perfect ease inside of five minutes, provided the surface is polished, of course. The solution is in a concentrated form. You dilute with water, warm it, place in a porcelain or glass vessel and place your article in the fluid, and then hold a small piece of zinc, which comes with the package, in contact with the thing to be plated. Instantly you have a coating of gold on whatever you wish to plate. It also deposits the same amount of metal on the zinc, and, that, of course, is lost, as each time you need to clean the zinc thoroughly. It is all done in a moment almost. I have procured some of the silver plating also, but as yet have not used it. It stands perfectly well in the mouth. You can solder gold on steel wire perfectly well, and it seems to be very nice. By giving piano-wire in the mouth a gold finish in this manner, the patient appreciates it and it is very useful.

While I am on my feet I want to make another suggestion. We are all aware that dealers send us with our engines very poor engine cord. That is so easily obtainable that it is within the reach of all at very little expense. The cord I have reference to is used for lacing-cord for ladies' bicycles, and can be obtained at all the bicycle supply stores. It is nicely woven, and the expense is about one cent a yard.

The PRESIDENT. Has it advantages over the old cord?

Dr. GAYLORD. It is much better and is more firmly woven. The old ones soon wear out.

I want to suggest another point to those using the De Trey gold, although it may be serviceable in other forms of gold also. Many of us have misgivings about placing crystal gold at the cervical wall of our cavities. To those who have and practice using soft gold, by which I mean gold that has not been annealed, I would say place it upon the floor of the cavity and gently pack it in place without condensing. Make your cavity one-third full, then place upon it a light thickness of De Trey gold. Commence with broad-faced pluggers and gradually knead it in position. What I mean by kneading is gradual pressure upon the gold, carrying it into the cavity; then increase your condensing force until you are satisfied it is sufficiently condensed. The De Trey gold acts as

a hub upon the soft gold and does not allow it to roll. If you want to finish it in that manner you can do so and work very rapidly.

A paper was then read by Dr. C. L. GIBSON, of New York City, entitled "Cancer of the Lip."*

Discussion.

Dr. C. N. DOWD. With regard to cancer of the lip, there are two or three points which are of special importance. One is the very good cosmetic results which plastic operations give at that place. There is no place on the face from which a large portion of tissue may be removed and leave so little scar as from the lip. Half of the lower lip may be removed without leaving a scar which is perceptible except on close examination. The entire lower lip may in fact be removed and still leave a very slight scar. I have brought two photographs which show the effect of that operation upon a patient; one shows the face before the operation, and the other a year after. The cancer had been of four years' duration, the last year being one of rapid growth. A year after the operation there was so good a cosmetic effect that one would hardly notice that he had lost any portion of his face. Another point refers to the ultimate result. The prognosis of cancers of the lip is probably as good as the prognosis of cancers anywhere, excepting the type which is called rodent ulcer, a growth which occurs on the upper part of the face and which is very slow indeed. The diagnosis of the lip is made more quickly than in most other locations; that may be the reason. The treatment of cancer depends largely upon the time at which the diagnosis is made. If the diagnosis is made early, we may be pretty sure of eradicating the disease in a large proportion of cases; and inasmuch as cancer of the lip is in a noticeable place, we may expect the diagnosis will be made earlier than when located in other parts of the body. I feel it comes within the province of the members of the allied profession to notice these growths. You must see a great many of them, and it is certainly much to the point that the diagnosis should be early made and the treatment follow accordingly.

Dr. J. B. WALKER. I have been very much interested in Dr. Gibson's paper, and think he is correct in saying that physicians should have the assistance of dentists in cases of cancer of the lip. It has been my experience that the glands are involved at an earlier time than Dr. Gibson states. Patients have told me that they have had the lumps come under their chins a year after they noticed the erosion on the lips. Certain cases that are treated with caustics, though they seem to scab over and the ulcer dries up, yet we find a portion adheres and the epithelioma comes back again. I have seen within eighteen months three cases where the disease began in the middle of the cheek inside, and in two of those cases the men said they were in the habit of putting the pipe in the mouth and holding it in the cheek. That probably caused a little erosion at first, and then the growth started. Dentists often see

*For the paper in full, see page 437 of the current number.

erosions on the tongue, and in many cases there is a history of a broken or decayed tooth. If a man sees this little ulcer on his lip and neglects it, the results are very disastrous.

Dr. Herbert W. F. Cady. In my duties as surgeon in the De Milt Dispensary I am constantly seeing epithelioma of the lips and tongue caused by dental irritation. There was one case that was treated by a physician here in New York for ulcer of the lip for a year, and finally he concluded that it was an epithelioma and turned it over to the surgeon, and it was operated on in the Cancer Hospital. I think they operated on this man twice, and the contraction of the lower lip was so great that the lip was drawn over the teeth, which was a source of constant irritation. The man was sent to me to have the teeth extracted. I put him under gas and extracted his lower teeth. Having seen this case of Dr. Dow's at the Surgical Society, it seems to me that the patient would have done better had he fallen into the hands of Dr. Dow. The man's daughter came in to see me to-day at the De Milt Dispensary, and said the epithelioma had recurred and the man was very low, and if I wanted to see him alive I must come at once. He was operated on two or three times, and a cure was not effected. I saw quite a large epithelioma in a woman seventy years old, but she said she had had it three or four years already and thought she could stand it until she died. I showed that case to the New York Dental School. This was a result of dental irritation also.

Dr. J. B. Walker. In the last two years I have seen a number of epitheliomata of the lip which have been operated on, and I have been very much surprised by the fact that there were no firm contractions. I have seen the entire lower lip removed, and in a year from that time you could hardly notice it. In a case of my own the top of the triangle was one and one-quarter inches, and some of the gentlemen suggested splitting the cheek on either side so as to relieve the tension. I did not do so, but separated the mucous membrane from the maxilla; the man came to me to-day, and you could not see at a distance of ten feet that there was any marked contraction. That has been the experience of both Dr. Bull and Dr. Weir, that the lip did not suffer these marked contractions which were generally feared at the time of the operation.

Dr. Wm. Jarvie. I do not know anything about cancer, but I have been very much interested in the subject and in the paper, and a couple of questions have arisen in my mind which I should like to ask. I should imagine from remarks heard to-night that cancer of the lip was almost always caused by some local irritation or bruise, from the fact that the cutting out the affected part in many cases effected a cure. From the experience of Dr. Cady at the De Milt Dispensary, we must imagine that cases occur more frequently among poor people, those not well housed and poorly nourished. There are a large number of dentists present who are constantly at work on the mouth, and they very seldom see cases of cancer of the lip. I have never seen one among my patients, and have only heard of one in the practice of my confrères. That

was in the case of a clergyman of Brooklyn. He wore a full set of artificial teeth, and called upon his dentist to have a new set made. The dentist took the impression, and while doing so noticed a little sore, as he expressed it, which made him unusually careful in putting in the impression-cup, so that the lips would not be stretched. Within two weeks the gentleman was dead,—the disease was so rapid in its course. An operation was performed, but without success. I should like to hear from the essayist in regard to the points I have made, whether these cases are more likely to occur among the poorer classes, and whether they are the effect of some bruise or wound upon the tissue. I always supposed that cancer developed from virus in the system, and might locate itself in any part of the body, and if removed by the knife would be apt to recur in some other part.

Dr. WELD. That which mostly interests dentists on this question is early diagnosis. We all know that dentists have opportunities for a very close inspection of the lips and the mouth. I have in mind at the present time two cases of two different women, whom the surgeons said died for the reason that they kept their trouble a secret; they would not even tell their friends that they had a "sore," as they termed it, upon their breasts. Had they informed their doctor a year or two earlier, their lives might have been spared, or at least prolonged, and that is where this paper becomes practical for dentists. The dentist may observe some sore upon the lip, or the cheek, or the tongue, and, acting in cooperation with the physician or surgeon, be of great benefit to his patient.

Dr. M. L. RHEIN. I agree with Dr. Jarvie's view of the subject, of the non-prevalence of epithelioma in our private practice. While I was quite familiar with the appearance and with the operation of removing the forms of epithelioma during my hospital service, I have failed to see in my dental practice a single case of true epithelioma of the lip, although I have had a number of cases of benign tumors, and what we term cancers inside of the mouth due to irritations. I also think Dr. Jarvie has called attention to a good point in this matter, that is, its prevalence among the poorer classes of people. Perhaps the prevalence of filth among these people has a great deal to do with it. It is the absence of cleanliness about the faces of those cancerous patients that has attracted my attention. A man who smokes a clay pipe has often a dirty lip. It is this constant irritation of the mucous membrane which I think has a great deal to do with the development of these growths. It is not the traumatic effect, or a single accident, like an accident from the impression-cup, but it is the constant irritation of the clay pipe, together with the particles of dry dirt which usually clog about the junction of the skin and mucous membrane of a certain type of smoker. Since some of the speakers have diverged somewhat from the subject, it brings to me the number of growths inside the mouth that have come under my observation, the causes of which have all been a constant irritation of some kind. A number of these cases have been

due to irritation by poorly fitting artificial dentures. I have seen a number of them removed and cured on the application of a more perfectly fitting denture. We all have heard of cancers of the tongue and other portions of the mouth, due to the irritation from broken-down teeth. It is given as a most common source of internal cancers of the mouth, and I simply bring that out in connection with the point of continued irritation being an etiological factor in this class of cases.

Dr. B. C. Nash. The question of predisposition has not been touched upon at all. Cancer in one part of the body would necessarily be supposed to have the same predisposing causes as cancer in another part. I think it would be well if that could be elaborated upon.

Dr. O. E. Hill. Dr. Nash has suggested a point which I always supposed was of utmost importance,—the predisposition to cancer in the system, that it simply waits for a favorable opportunity to develop either from a bruise or a fall or any other accident that may occur. I have had three experiences with cancer. Dr. Jarvie will remember one of them. A man came to me with terrible pain in the lower maxilla. I looked the case over very carefully and could not discover that there was any cause for it, and I told him to come again. In the mean time I asked Dr. Jarvie to come to the office, and we looked at it together very carefully, and made up our minds that there was no evidence of any inflammation or disease whatever. The man died within six months afterward from cancer of the jaw. As to the opportunities dentists may have for discovering cancer. In operating, it is often our custom to put our arm around the patient's head. In putting my arm around the head of the lady I speak of, it rested slightly on the shoulder; she asked me to raise the arm, as she said there was a very sore spot on her shoulder which had discharged for some time. I asked her if she had seen a physician, and she said she had not, and I asked her to show it to me, as I knew her very well. I sent her to Dr. Hutchinson, of Brooklyn; he diagnosed a cancer, and later removed the left breast and clear around to the back of the shoulder. She died within a year.

Dr. C. L. Gibson (in closing the discussion). My first note is about the question of traumatism. Possibly the term as I used it is misleading. If I had said irritation it might be more clear. If a man's lip is being constantly irritated by a clay pipe or by decayed teeth or by cracked or chapped lips, it is a traumatism, and traumatism is one of the most clearly recognized factors in cancer. As to social conditions, that is an interesting and important question. We know very well that ordinary forms of cancer are prevalent with persons in good social condition. In religious communities, in monasteries, for instance, where the monks lead an ascetic life with sparse diet, there is very little cancer; but in nunneries, where the diet is better, the nuns are quite susceptible to various forms of cancer. But cancer of the lip does occur mostly in persons in the poorer walks of life, and undoubtedly the gentleman who expressed the opinion that it was due to

the dirty condition of the lips was quite right. This foul condition that the lips get into undoubtedly renders the mucous membrane less resistant to irritation. I was asked as to whether the glands were involved in the specimens exhibited of removal by the V incision. Decidedly no. If they had been, this excision of the V-shaped portion would not have been done; you would want a more liberal operation than that.

The question was raised as to whether swollen glands appeared in cancer of the lip. I think I stated in my paper that they did, but the swollen glands occur at a much more remote period in cancer of the lip than other cancers. While the glandular affection may be postponed for several years, and may never occur, and the patient may die before the disease gets so active, the general rule is where ulceration has begun, the glandular affection starts in, but it is not evident. The glands may be affected before we can feel them. When they are felt, they are generally several times larger than the normal. As to the clay pipe, I would say that in all the statistics the prevalence of pipe-smoking is noted. I think in Warren's collection, one of the old authorities, seventy out of seventy-seven patients were pipe-smokers, and the great majority were clay pipe-smokers.

The PRESIDENT. Have you ever had a clay pipe in your lips?

Dr. GIBSON. Yes.

The PRESIDENT. And have you not noticed that sometimes the mucous membrane clings to it?

Dr. GIBSON. Yes, and that may result in the traumatism. The question of predisposition is very interesting, and one I should like to answer if I knew anything about it; but if I knew more about predisposition I would know more about cancer. We know certain parts of the body, for instance the junction of skin and mucous membrane, have a particular tendency to cancer. Why it exists I do not know. It is simply that cancer, being a manifestation of irregular tissue-formation, takes the opportunity to develop there. We have touched on many interesting points to-night and have heard many interesting examples. Had my subject been cancer of the stomach or of the breast, we might have received as many interesting observations as have been related to-night.

A unanimous vote of thanks was tendered to the essayist for his interesting paper.

Adjourned.

JOHN I. HART, D.D.S.,
Editor Odontological Society.

SEVENTH DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE Seventh District Dental Society of the State of New York held its twenty-ninth annual meeting at the New Osburn House, Rochester, N. Y., April 27 and 28, 1897, Dr. B. S. Hert, of Rochester, presiding.

The president took for the main subject of his annual address "Conscientiousness in Dental Practice," dwelling upon the obliga-

tion of every dentist to perform every service in the most careful and thorough manner, and not to undertake more work than he can afford to do thoroughly. The annual address was not discussed, and the routine business of the meeting was next in order.

The reports of the various committees were received and considered.

The corresponding secretary said in pursuance of his duty to gather information for the good of the society he had submitted the following question to a number of eminent members of both the dental and the medical professions:

"Would a closer professional relation between the medical and the dental profession elevate the members of both professions, and broaden the field of knowledge and benefit the patients of both?"

He read letters from many eminent men in both professions, all of whom gave emphatic affirmative answers to the question.

He also read a letter from the publishers of *Items of Interest,* inviting the members of the Seventh District Dental Society to attend a dental meeting to be held at the Twin Mountain House in New Hampshire in July.

The preliminary business having been finished, Dr. F. W. Proseus, of Rochester, read the following paper:

Practical Hints on Crown- and Bridge-Work.

When your committee requested me to write a paper for the Seventh District Dental Society, I hesitated before complying with their request. The subject of crown- and bridge-work has been extensively discussed, and there are many methods used, all of which meet with varying success and favor. While to many the points which I suggest may be familiar, if to any they should be new or more practical than the methods they are now using, the essayist will feel well repaid.

All are familiar with the Richmond crown. While its construction is simple, there are several features in regard to preparing the root for its reception, forming the joint, grinding the porcelain facing, etc., which are very important in saving time, giving strength and cleanliness, and protection from breaking of the porcelain in occlusion.

In preparing the root, be sure to have the sides well beveled; this is of great importance. Bevel the labial surface at an angle to suit the particular case (Fig. 1); use a narrow carborundum wheel, and concave the whole surface from before backward, leaving the sides at least one-sixteenth of an inch higher than the center. Open the pulp-canal with a large round-head bur, carry it in one-half or one-third the distance of the root, then continue with smaller burs. By using different sizes, the course of the canal may be followed, going slowly at first, the patient being told to apprise the operator of the first feeling of heat from the bur. Make the canal as deep as possible. Open to end of root, and fill in whatever manner may be preferred. The object of enlarging the pulp-canal to good size is to secure strength. The root being concaved and the post hole

large and roughened, there is little danger of a crown working loose. The strength gained by this plan over that of having a tight-fitting cap to end of root and a small post hole will be easily realized.

The band is to be made as ordinarily, being sure that it fits the beveled portion of the root tightly. Forcing bands far under the gums and crowding, does not mean good adaptation. Many cases are met where it is not advisable to use a band at all, or only a very narrow one is required. It is better not to use any band on Richmond crowns, than one that is too large.

Cut the band to bevel at the labial surface, and solder on the cap after punching a hole for pin. Use a large square pin, filed slightly tapering, grasp with flat-nose pliers, and pass the pin through the cap, carrying it up as far as the canal will permit, remove both together and solder the pin to the cap; cut the pin off even with the cap on top, replace the cap and concave the labial surface by burnishing and carborundum stone. Now select the

FIG. 1.

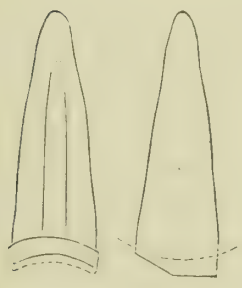


FIG. 2.



FIG. 3.

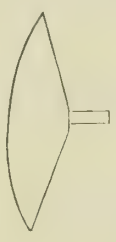


FIG. 4.



porcelain facing, grind the neck to proper length and shoulder flat from the pins. Grind the tip or cutting-edge, beveling from the pins to a feather edge at the tip. (Figs. 2, 3.) This allows the solder to form a stiff heavy backing and grinding-surface, which is especially advantageous where the bite is close, and it is desirous to have no gold in sight.

Take backing 32 gauge twenty-four carat gold annealed, fit to the pins and burnish to the sides, tip and neck. Nick the pins with a sharp knife and cut off the extra length. Bending the pins has a tendency to strain teeth and cause cracking under heat, where by simply notching them the backing is held firmly in place, and after the extra length of pin is cut off they do not show through the solder after the case is completed. Cut off the margins of gold, file or stone the edges toward the facing, thus bringing it down snugly all around. To form the joint between facing and the cap, grind only the tip of the neck to fit the concaved surface of the cap. Flow pure beeswax around the sides and in V between the cap and facing. Fill the remaining space with hard wax made of seven parts pure beeswax, four parts gum dammar. Invest, break out the hard wax before heating, allow the remaining wax to be absorbed by the hot investment. The solder will take the place of the wax in the V and form a perfect joint. (Fig. 4.)

We will next consider the different gold crowns or caps with which a five-tooth bridge is to be constructed, from the lower third molar to the first bicuspid, the two abutments leaning well toward each other. (Fig. 5.) There are several important points to be considered in this case. The bicuspid leans outward and backward, the alveolar ridge is rolling and thin, and the bite is close. Let us first consider the preparation of the teeth. The sides must be well beveled, as the gum margin is thin and hard, the labial surface of the bicuspid is full and rounding, and no amount of grinding within reason will bring it to the proper bevel at the labial surface. The grinding-surfaces are cut well down to allow heavy caps of gold. Now a great many would simply take a rough impression of this and make the caps in the laboratory. This is a

FIG. 5.

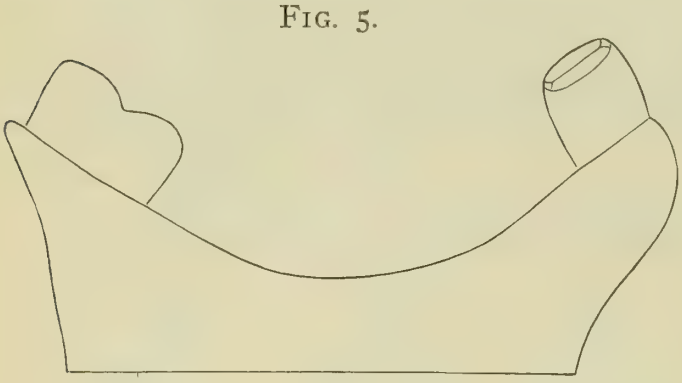


FIG. 6.

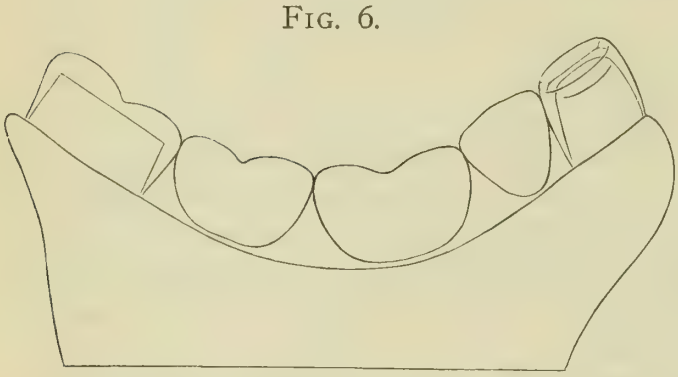
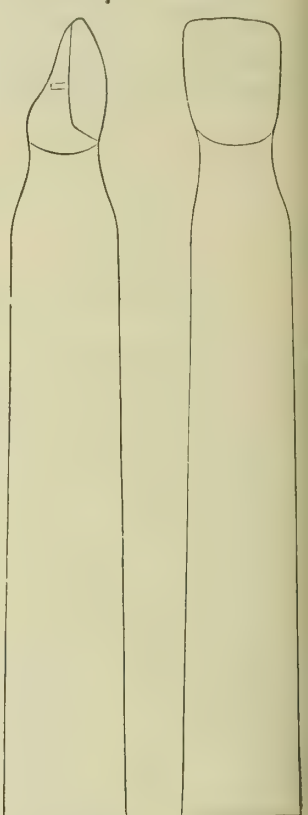


FIG. 7. FIG. 8.



great injustice to both the patient and our profession, as there will be many features a long way from perfection in the resulting crowns. One of the very important points in fitting crowns is to have bands fit as near perfection at gum line as is possible. Bands should be carefully made in the mouth and not pounded on; they should fit snugly by firm pressure of the thumb. A crown that fits does not require mallet blows to drive it to place. At the labial surface of the bicuspid, if the band is allowed to pass under the free margin, it will leave an overhanging ledge of gold and produce pericemental inflammation; cut the band off and allow it to go nearly to the gum line in such cases, thus leaving a surface which is easily cleaned.

Cusps are now swaged, cut out, filed flat and flowed flush with solder. The band is contoured and soldered to the cap. When

the bite is close and the cusps of the occluding teeth prominent, simply catch the cap with solder to the band and place the crown in the mouth. Instruct the patient to close firmly and you have the bite, then fill the cusp and flush with solder. Should any flow up the sides of band, place in a small piece of plate gold and the solder will flow back from the sides.

The overhanging portions of the crowns are cut off, as much as is allowable without endangering the pulp. Crowns are placed in the mouth, impressions taken in plaster of Paris, and a cast run. Now as the bite is close and strength is needed, discard porcelain facings: they only save a little gold, make extra labor, and weaken a case like this. Use 30 gauge, twenty-two carat gold, swage the caps and facings together, using dies ready prepared of zinc or Melotte's metal. The forms for these dies are readily made by using natural or porcelain teeth, fastened with wax, shaped and secured to a wood or plaster pattern.

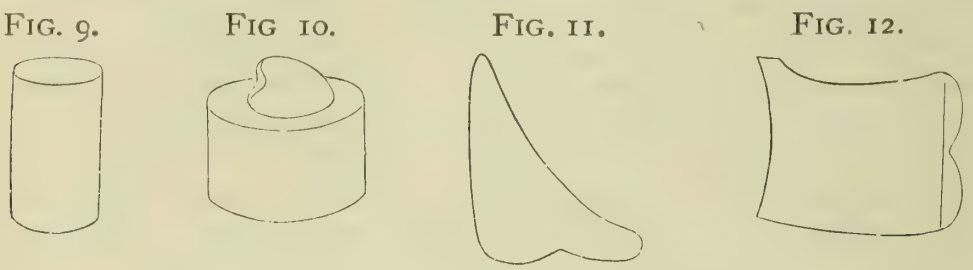
Swage into wood or lead, turn and contour the buccal portion to form a facing, invest, and flow with twenty-carat solder, polish and wax on the cast. Now in regard to cleanliness, one of the most important parts of successful bridge-work. Do not allow the suspended teeth to touch the gum. Make a space from one-sixteenth to one-eighth inch clear of the gum, so any particles collecting there may be easily flushed out with water. Invest and solder together with eighteen-carat solder, using just enough to give good firmness, finish and cement in place. (Fig. 6.) It may look as though it would not go on, but by using firm pressure, pushing backward and downward, the fixture here described will go in place if properly made in ninety-nine cases out of a hundred for which sectional bridges would otherwise have been constructed. There will be no cumbersome portions resting on the gums, to collect organic matter and cause the familiar inflammation seen with many bridge dentures.

Seamless gold crowns are in great favor with a large number of practitioners. I consider their use to have reached a point very damaging to bridge-work. Being quickly made, easily adjusted, and flashy, they appeal to a certain class simply because made of gold. Many anterior teeth are to-day being crowned with unsightly gold crowns, where a simple gold or plastic plug would have rendered better service. Of course the honorable dentist would not so abuse his profession by such practice. In making seamless gold crowns, I shall take up those for anterior teeth only. Cases occasionally occur where a heavy beard, shape of mouth, etc., justify the dentist in crowning with gold an anterior tooth; especially in this true of the cuspids when used for abutments in bridge-work.

Take natural teeth and saw off the crowns below the enamel line, form wood to the size and shape of die-stems desired, and cement the crown on to the wooden support with sealing wax and shape with hot instruments. Have these patterns cast in brass, file and buff them smooth. (Figs. 7, 8.) By having fifty or one hundred of these dies, nearly any tooth that presents may be

quickly supplied with a fairly well fitting crown. Stamp out shells by the Morrison system, having the gold well annealed, select the die desired, place the shell over it, and using a small hammer tap lightly and draw down as closely as possible. Anneal and swage into soft wood lengthwise of the grain; this draws the cutting-edge and lower half of the crown close to the die without cutting or breaking the gold. Now by using the pliers, the crown is easily contoured and shaped at the neck. Flow the tip inside with solder, and finish ready for adjustment. Thirty gauge, twenty-two carat gold, works somewhat hard, but if the band measure is correct and all prominent ridges at the neck and sides of the tooth are cut away, there will be little difficulty fitting the crown.

Many dentists use twenty-three and one-half carat gold in making seamless crowns; this will draw out rather thin in forming the crown. While it may do in single teeth, it is well to avoid so high a carat, especially in bridge-work. As the crowns are soft and the gold draws so with ordinary force, there is a constant strain on the anchorage, and finally the bridge comes off. If a lower carat gold had been used, or if for the bicuspid and molar crowns bands had



been made, this would not have occurred, because when a band is made and cap soldered, it has to fit the tooth before being soldered, as being stiff it cannot be bent in any direction to suit after making. Of course all things are abused, and so with seamless gold crowns. For example, it would take one hour to insert a nice gold filling for which the dentist with a fair practice would get five dollars. He may be doing a great deal of amalgam work, and being busy, takes five minutes to get a wire measurement and impression and send to the laboratory, and fifteen minutes to cement the crown in place. Patient pays ten dollars, gets a solid gold tooth as thin as tissue-paper, and is happy.

To make an open-faced crown, select a die as nearly like the tooth as possible; by filing or grinding it may be made the same. Simply cut out the face of the crown as desired. The tip and back should be well reinforced with solder for the anterior teeth; this gives sufficient stiffness to the crown, and if properly adjusted will do good service.

Where bicuspids are broken down and the labial wall gone, a porcelain facing may be used with a gold crown to advantage. Back up with gold a small porcelain facing, allowing the backing to cover the entire back, cut out the face of the crown with a saw or stone and fit the facing to place. Wrap in asbestos paper and wire to place, then solder in the flame of a Bunsen burner.

Occasionally patients wish a crown on a rubber denture, for example bicuspid. Take a porcelain crown for rubber work, and make a mold in Melotte's moldine. Cast in metal and swage in wood; only the buccal portion and cusps are desired. Make the inside retentive in form, roughen and invest as ordinarily. (Figs. 9, 10, 11, 12.)

(To be continued.)

Union Meeting of the Maryland State Dental Association, Washington City Dental Society, and Virginia State Dental Association.

The above named organizations met in joint convention in the Hygeia Hotel, Old Point Comfort, Va., Thursday, Friday, and Saturday, April 6, 7, and 8, 1897.

First Day—*Morning Session.*

The session was opened by Dr. J. Williams Donnally, chairman of the Committee of Arrangements, who introduced Dr. T. H. Parramore, chairman of the Executive Committee, who delivered a short address of welcome in which he stated: It is a very general opinion that dentistry is a comparatively new science, while in truth dentistry as a science existed thousands of years ago, even in the days of the Pharaohs, when the valley of the Nile was the center of civilization, of science, of art, and of literature. But as a profession only it is new. The reason it did not advance from a science to a profession, and the reason that as a science it made until recently so little advance, was because all practitioners of dentistry kept the knowledge of their art as completely secret as possible. This was the rule until recent days. The United States was the first nation in which dentistry took its place as a profession, Maryland the state, and the city of Baltimore the place of its professional birth. The Baltimore College of Dental Surgery and Dr. Chapin A. Harris were the organization and the man to whom the first advance of dentistry into the professional rank is chiefly due. In conclusion, Dr. Parramore bid the visiting societies welcome in the name of the state of Virginia and of the Virginia State Dental Association.

Dr. T. S. Waters, president of the Maryland State Dental Association, and Dr. D. E. Wiber, president of the Washington City Dental Society, responded in behalf of their several societies. The afternoon sessions were devoted to clinics, of which a report will appear later.

Evening Session.

The convention was called to order at 8 P.M., Dr. T. S. Waters presiding.

Dr. J. V. Haller, of Wytheville, Va., made an address on Professional Education. He insisted upon the necessity of a higher standard of preliminary education for those entering dental colleges, as a means which would result in great benefit to the pro-

fession, by enlarging the scope of its influence and usefulness. The course of study at the recognized dental colleges is reasonably full and complete, and such as to insure a reasonable degree of proficiency on the part of those who faithfully pursue it, but more must be done to the end that dental surgeons may become more fully equipped to enter upon their chosen profession. The limit of investigation and discovery is not yet reached. The science is ever growing and expanding, and no true professional man can afford to remain ignorant of or be deficient in the highest degree of learning and skill attainable.

He insisted upon the necessity of continued study through professional life. The dentist should and may continue through life to learn things that will increase his usefulness and proficiency. His profession is his life-work, and no limit should be placed upon his ambition to elevate by research, by study, and by discovery that profession. He thus honors himself as a man and as a member of his profession. He firmly believed in the necessity of post-graduate courses for dentists.

Dr. Jas. McManus, of Hartford, Conn., read the following paper:

Some Professional Facts.

In selecting a title for the paper I have prepared to read to you, I had in mind the fact that Horace H. Hayden, M.D., a Connecticut man, was the first to suggest holding a convention of dentists as early as 1817, and that he, with others in practice sixty years ago, recognized that only through the influence of societies and educational institutions could dentists make any effectual claim to be recognized as members of a profession. The first dental society was organized in 1840, and Dr. Hayden was elected president. The Baltimore College of Dental Surgery commenced its first sessions in 1840, and Dr. Hayden was the president and also Professor of the Principles of Dental Science. In 1846 a chair was instituted and mechanical dentistry was taught by another Connecticut man, C. O. Cone, M.D., D.D.S. From the establishment of the Baltimore College on to the present time the question has been a debatable one whether dentistry is a profession or a mechanical trade. Dr. Hayden was a scholar, scientist, and an M.D. Dr. Cone was an M.D., D.D.S., an artist and a mechanic, and under these able teachers the students gained both professional and mechanical instruction. In 1845, a dental college was established in Cincinnati, Ohio, and dental societies were organized in different parts of the country. The outlook was promising and hopeful, for the pioneer college and society men in those days were zealous, enthusiastic, and earnest workers. The societies and colleges were so prosperous that another forward move was made in 1860, when the American Dental Association was organized. Each state and local society in the country was entitled to send one delegate for every five active members to represent them in the association; and they, after serving one year as delegates, might elect to continue on as permanent members. A number of these pioneer dentists were men who had a medical degree, but their ambition was to gain

for dentistry a place among the liberal professions. The colleges and societies they helped to establish were for the purpose of giving to the dentists of the future every opportunity to become competent professional men, and the success of the colleges tells plainly that the aim and desire of the students in those days at the start was to become members of a profession. A college diploma entitles the holder to rank as a professional man. How many practicing dentists in the past, or at the present time, live up to all the requirements that the name professional implies? Do you think that the majority of the dental graduates in the past have done so? The question is a pertinent one, when even the casual observer must know that they have not. It would seem as if the only ambition of a majority of the graduates for many years past was to find a good location and get down to work, filling and extracting teeth, and making artificial ones, and stopping right there. They have ignored their state society, taking apparently no interest whatever in professional advancement. We know many that have gained a good business, as well as the confidence of the community where they reside, but the shoemaker, cabinet-maker, jeweler, and other artisans have worked just as hard and skillfully, served their patrons as honestly and faithfully, and so far as outside efforts are concerned, are just as much entitled to be called professional.

The dental graduate who neglects to occasionally revisit his college, who fails to keep in touch with his professors, who forgets his classmates and who avoids associating with his fellow-practitioners, and keeps aloof from his state and local society gatherings, can hardly be considered a professional man. The laws now in force in the United States give to all licensed or registered dentists an equal standing as practitioners. They do not vouch for skill or attainments. The college diploma is supposed to do that, and all holding diplomas are in honor bound to show to the world by their works that they are worthy the honor their college and state has conferred on them. We hear of guilds, lodges, societies, Masonic orders and military organizations, and in all of them may be found practicing dentists, who have attained high honors and exalted rank. I have known many dentists who were active members of several of these organizations, that are governed by strict rules, and failure to attend the regular meetings is punishable by a fine. The initiation fees and dues demanded amount to quite a sum of money yearly, and that money is earned in the practice of a calling that they are seemingly ashamed to be known as members of. They recognize the propriety of men engaged in other avocations joining societies and banding together for mutual improvement, but they in their special life-work let the community where they live see plainly that they are in business only. They may be skillful men and good citizens, but they fail in their duty to themselves and the community that gives them generous support, when they assume and allow the impression to go out that they are above and beyond all need of aid from associated efforts, or that they have any interest in scientific or professional advancement. That what I have stated is pitifully true the records will

justify me in asserting. It is estimated that there are twenty-five thousand dentists in the United States, and it is an open question whether one-fifth of that number are members of any dental society. The Connecticut Dental Association has a little less than one-third of the resident dentists of the state on its roll of membership, and I doubt very much if many of the other states can give as good a record. During the past ten years there have been sent out from the dental colleges ten thousand graduates, and as yet we get no report of an appreciable increase of society membership. We see few new names reported as taking part in the discussions at society meetings, and we have rarely an opportunity to read an article in the dental journals by a really new writer. The work of supporting the societies seems to be wholly in charge of the few who are left of the very old practitioners, who have labored in years past to help gain for dentistry the rank of a profession. In the record of the ten thousand dentists of the past ten years we ought to find the names of a number of earnest young men, who were enough in love with their calling and loyal to their college to wish to become known as permanent members of the American Dental Association. The record is a humiliating one. The truth will out. We can make no good claim that the graduates of the past have been loyal either to their colleges or to the profession. They have persistently left undone the things they ought to have done, and we have no evidence of professional life in them.

Dr. Barrett's paper on "Whither Are We Drifting?" read by him at Asbury Park in 1895, states, "We all agree that societies are more potent for the elevation of our beloved profession than any other known means." That statement is absolutely true of the societies of twenty-five years ago. The influence they exerted at that time was general throughout the country; the meetings were largely attended, many of the members were enthusiastic workers, and one of the great results from their labors may be seen to-day in the many well-equipped and prosperous dental educational institutions of this country. Dr. James Truman, in a recent editorial, tells us that "the history of financial sacrifices made by dental faculties to educate the dental profession to a higher standard of training, as well as that of the public, has never been written, and probably will never be appreciated." Everything that has been done in the past to benefit practicing dentists is primarily due to the work of dental societies. Colleges have been established and they have been successful. State laws have been enacted, and dental examining boards have been appointed and given full powers for several years past. Every aid that educational institutions and state laws could give to the dental graduate to make him a professional man has been granted to him, and now what evidence is there that these advantages are or have been appreciated? The one representative dental association of the country that has steadily held high the standard of dental education, that has labored in every department to advance the interests of every individual practicing dentistry in the world, that has published valuable papers in its yearly Transactions, and has anxiously hoped

for and invited to membership the ablest representative men in dentistry for thirty-seven years past,—an association that every dentist should feel proud of and gladly contribute the small sum of money its membership demands to help it along in the good work it has been doing since its organization,—has failed, miserably failed, to get the support it should have had from the graduates of the past. It may be a surprise to some of you to learn that the number paying yearly dues to the American Dental Association has not averaged over one hundred and seventy-five members for the past fourteen years. In 1896 there were one hundred and ninety-two members. One hundred and seventeen of these were members in 1894, and forty-nine were members in 1884. Of the one hundred and ninety-two members in 1896, there can be credited to New York eighteen; Philadelphia, twenty-one; Chicago, thirteen; Boston, six; Cincinnati, five, and Baltimore, three, in all sixty-six members from six cities that at a low estimate are said to have over three thousand practicing dentists within their limits. These six cities are the oldest educational centers in this country, and there are more men engaged in teaching dentistry in these cities than there are members of the American Dental Association. From these six cities we have only thirty out of two hundred engaged in teaching dentistry who think enough of the association to be members and give it their support. In the six cities named Baltimore has three dental colleges, Philadelphia three, Boston two, and Chicago five, making in all thirteen colleges. In the report of Dr. Ottofy, chairman of the Committee on Dental Education, published in the Transactions for 1895, we find that there are forty-eight colleges granting the dental diploma. The teaching faculties, professors, lecturers, and demonstrators attached to these colleges number four times as many dentists as there are members of the association.

In grouping the one hundred and ninety-two members for 1896, we find the West credited with fifty-three members, the Middle States with eighty-eight, the South, far West, and California with thirty, and the East or New England with only fifteen. New England, cultured, educated, progressive New England, as it has been sometimes lauded, has over two thousand dentists, and oh what a record for professional spirit! The state of Maine, with a state society and two hundred and eighty-six dentists, sends no representative and has no permanent member. New Hampshire, with a state society and one hundred and sixty-nine dentists, no representative or permanent member. Vermont, with a state society and one hundred and forty-two dentists, sends one representative. Rhode Island, with a state society and one hundred and forty-two dentists, sends one representative, who has been a permanent member for several years past and is also one of the faculty of the Harvard Dental School. Connecticut, with a state society and three hundred and seventy-five dentists, sends six representatives, four of whom have been permanent members for many years. Massachusetts, with a large state society, several city and local societies, and over one thousand dentists, can spare only seven

dentists to represent them. Boston, with three hundred and twenty-five dentists, the Harvard Dental School with thirty dental teachers, and the Boston Dental College with twenty-one dental teachers, happens to monopolize delegates and permanent members, and has six to her credit. The odd one to make up the mystical number seven and to represent the remaining seven hundred dentists of the state lives in Springfield, Mass. The New England record is not a professional one, for when we look at the reports of the one society of the country where membership stamps a man as a reputable practitioner, and a representative member of his calling in the state or city where he lives, whose yearly printed list of members is a guarantee to fellow-practitioners in every quarter of the world that the names found on that roll are men who can be relied on with confidence, and when on that roll there can be found the names of only fifteen men to represent the six New England states with two dental colleges and over two thousand dentists, we must accept the record. The true professional spirit lies dormant, if it in fact ever existed in New England. The West and South are to be congratulated, for they have by comparison made a good record; but the dentists of New England and the Middle States, who have had offered to them every advantage and facility, have failed to foster and live up to the professional standard. The publishers of the DENTAL COSMOS, the best journal published in the interests of dentists in the world, and the *International Dental Journal*, published by dentists for dentists, both conducted on professional lines, could tell, if they cared to, how few among the twenty-five thousand dentists of the country were subscribers to each or both of these journals. If a vast majority of the dentists do not take these journals, and a large majority of those who do take them cannot find time to read them,—as is often stated,—it would seem as if the professional interest in our best journals was on a par with the professional interest in our societies.

The value of a newspaper or magazine, religious or secular, is often judged, and rightly, by the character of the advertisements admitted to their columns. In a number of the dental periodicals in the United States there are advertisements published of secret remedies, and they are virtually recommended to all dentists as safe preparations to use, when it is well known that some of these compounds are not what they are represented to be, and where indiscriminately employed they may cause serious trouble and annoyance. Of late, a new feature in advertising has been added, inviting the young dentists to invest in tastefully illustrated advertisements,—a luxury which, if indulged in, will of necessity bar him from membership in dental societies. The responsibilities of the editor of a professional journal do not cease with his supervision of the reading matter contained in its pages. He should also be watchful and prevent the appearance of any advertisement of a questionable character that might mislead the unwary or thoughtless, and that would tend to lower the professional standard of his journal. It is hardly necessary to state that there are many

dentists connected with the management of the dental periodicals who are not in touch personally with the American Dental Association.

We read occasionally of dental college alumni meetings, but there is no record, to my knowledge, of any of the alumni gatherings of late years doing anything to materially benefit, or to help along, the management of the colleges. We rarely hear of any suggestions being made or action taken, or any gift offered to enrich the library or museum, or in any way to aid the college faculty in their work. Whether the faculties have been somewhat in fault for not holding a closer relationship with the graduates is another question. Whatever reason may be offered, the fact asserts itself; the graduates have not been the power for good that they might have been. In all the large cities of the country you hear of university clubs, artists' clubs, actors' clubs, and bicycle clubs, each having rooms kept up in good style for social intercourse, and where business interests may be talked over by the members and their friends. The medical men have their society rooms, with good library accommodations and the best medical journals and papers on file, and all other requisites for the social and professional advancement of their members. The expense of keeping up these rooms or clubs is comparatively small, considering the advantages that are gained in having access to all the professional and much of the current literature of the day. The dentist, visiting either New York, with twelve hundred dentists; Chicago, with seven hundred; Philadelphia, five hundred; Boston, three hundred; San Francisco, two hundred and fifty; Baltimore, one hundred and eighty-five, will seek in vain in any of these cities for a dental club-house. In this respect dentists as dentists do not make as good an impression on the public for sociability, nor are they as well off as the bicycle rider, who is sure to find a pleasant resting place in one of the many club-rooms to be found in all our cities. There is just one intensely pleasant fact to report and to rejoice over, and that is the establishment of a dental department in the Army Medical Museum in Washington, D. C. Thanks to the efforts of the Washington City dentists, there has been secured for all time, under the care and at the expense of the United States government, suitable rooms and accommodations for a complete dental library and museum. The rooms are open at proper hours to the public, and every facility will be afforded the dentists and medical men of the world who wish to inspect the specimens collected in its museum or to study the works on dentistry contained in its library. It is to be hoped that the dentists of the entire country will appreciate what has been gained for them, and co-operate with the curator of the Army Medical Museum by sending to him any specimens or books that they may have to spare, to help add to the value of this national collection.

There seems to be a disposition among quite a number of highly reputable men to ignore the title of D.D.S., or the name dentist. The good old title of Doctor of Dental Surgery was not pleasing to the ears of the Harvard University management when they estab-

lished a dental department, and they deliberately made a new departure, and by implication cast a reflection on the colleges that selected that title. The Harvard graduate is known by the degree of Doctor of Dental Medicine, a title that has been conferred for the past thirty years; and with all the influence of Harvard University back of it, it has not yet been placed on the lists of college degrees in the latest edition of the Century Dictionary. The standard has been so often lowered by graduates in their style of advertising and conducting their business, that there may be some little excuse for clean, honorable men desiring to be known by another name than dentist; but with all the efforts that may be made by good men, the name dentist cannot be blotted out. It has age, and a history, and the masses know just what it means. The better way for these new-departure men is to return and work within state society lines, and endeavor to draw all the other reputable men within its circle.

There has been a great deal of talk and writing regarding the union of the American and the Southern Dental Associations. Suggestions have been offered, plans outlined, and the subject is to be considered at the meetings of both associations in August. There has, in my opinion, been a great deal of unnecessary anxiety over this union. Only one thing has been needed for years past to make the American Dental Association all its promoters hoped for, and that is an increase of permanent members from each state. If the men who have joined the association in years past had continued on as permanent members, and there had been a reasonable increase of new members, as there should have been, we would now have an association powerful and rich enough to easily do the work that Dr. Kells, in the April DENTAL COSMOS, wants two hundred and fifty dentists to contribute each one hundred dollars to have carried on. Occasionally we hear it intimated that certain dentists in certain localities average at least ten dollars an hour for every working hour in the year. One might reasonably expect that such fortunate men would willingly give the earnings of half an hour a year to sustain the representative association of the country, especially as they get in return a book of Transactions that is richly worth at least half of that amount. I have looked in vain for the names of several of these fortunate men in the printed lists of members, and I am forced to believe that it was that class of men that that great genius in dentistry, Dr. Garretson, referred to in 1866, when he said, "They had a title which its possessors certainly did little, in the public view at least, to render scientifically honored, valued, or known."

We can now point to forty-eight institutions where dentistry is taught, an Association of Dental Faculties, a National Association of Dental Examiners, and a number of journals devoted to dental literature. We have had a qualified recognition from the American Medical Association and a section at several meetings of the International Medical Congress, and with all these advantages it appears that society and professional interests are at a very low ebb. It is astonishing the great number of men who have joined societies,

remaining members until they have absorbed an office or had a paper published in the Transactions, and then they have quietly dropped out, and taken on trade peculiarities. The facts I have related to you show how poorly dentists, particularly graduates, have supported journals and societies; and as figures naturally and easily follow facts, it may interest you to know that during the past twelve years the American Dental Association has paid out for section work, experiments, investigations, and special scientific research, and to aid the Columbian Dental Congress, nearly six thousand dollars. We have no means of getting at the amount of money that was raised to fight the Dental Vulcanite Company, or what has been paid in to the Dental Protective Association since its organization, but we are safe in asserting that the larger part of all the funds raised was given by society members, and that the sums amounted to many thousands of dollars. The work done by the societies has saved to the practicing dentists all over the country an immense amount of money, and it is about time that some active measures should be taken to increase society membership, and to let those who prefer to stay outside the fold hereafter protect and take care of themselves. The only way that seems open just now to increase society membership is for the old men in dentistry to renew their youth, and start over again, and for those who are at present members of a society to make an effort and do a little missionary work, and go out into the highways and try to induce all the reputable men in the neighborhood to join their state society. The office student of the future may be easily influenced by the example set him by his preceptor, and if the college professors will give a little more attention to and advice regarding the value and character of the post-graduate school of instruction that society membership offers, if they will let students know that they are active interested members of their state society and the American Dental Association, and that they may, if they will, meet with them at least once a year and renew good-fellowship, we may be sure of a more interested and ethical class of practitioners in the future.

The contrast between the two representative associations of the country, the Medical, with five thousand members, and the Dental, with less than two hundred, is very noticeable as well as humiliating. As long as there is work for the American Medical Association to do, just so long should the American Dental Association be perpetuated and supported by the dentists. The mission of the state societies is to gather into the fold all practitioners who have the best interests of their calling at heart. The state societies are responsible for the character of the men they send to the American Dental Association, and they should see that representative men are appointed who will act, and, if possible, attend to the duties that are delegated to them. Union meetings can always be made popular and profitable. All that is needed now to make the American Dental Association all that its organizers hoped for as the representative dental association of the country is for a union sentiment to be cultivated, expressed, and made manifest by all the

state societies. It is not a question as to the union of or the perpetuation of the American or Southern Association, but shall new life, new members, and a generous support be given to the one American Dental Association, like the American Medical, that represents the entire country. The future dentist may affix M.D., D.D.S., D.M.D., M.D.S., Orist, or Stomatologist, on his professional card or on his door-plate, but a record of active membership in his state and the American Dental Association will give to the public assurance of his ability, and respectability that a title or college diploma cannot of itself or alone bestow. The one flagrant fact apparent to all is that college education and a diploma, with all the power that state laws and the board of examiners may exert, cannot make a practitioner ethical or professional, or deter him from bringing discredit on the practice of dentistry. All that has been gained, and all that we may reasonably hope to achieve for dentistry as a profession in the future, depends now, as it has in the past, on the earnest, faithful, and continued efforts of the members of our dental societies.

Discussion.

Dr. B. Holly Smith said that while the general sentiment of the members of both the American Dental Association and the Southern Dental Association seemed to be in favor of a union of the two, still there were some among those who have worked hardest in these associations who are not in favor. There is, in truth, a feeling of jealousy on the part of many in the Southern Dental Association against being merged in the American Dental Association. The Southern has equal claims to being considered a national association with the American, but if they could be united and membership in the new organization built up to what it ought to be, we would have a truly national body.

The states that have been recreant to the old associations should come forward and help to build up, by the union of the two, a truly national body. We hope to develop a control and a work far beyond the expectancy of the members of the two associations at present.

Dr. McManus had no feeling that either association should be broken up, but that they should unite their strength and influence. The state and local societies all over the country should send delegates to one national body, which should be recognized as national.

Dr. Smith had not intended to put the reader of the paper in a position of antagonism to the Southern Dental Association, but the impression made by the paper on his mind was that the Southern Dental Association was placed in antagonism to the American Dental Association. He did not want any such antagonism strengthened, because the only hope of a grand and powerful organization was in the hearty uniting of the forces of the two existing associations.

Dr. J. N. Crouse, of Chicago, had given much thought to the union of these two bodies into one. He had been a hard worker in the American Dental Association ever since he had been in the

profession. He had been one of the wheel-horses every year except one. He never did any work that yielded so little for the effort expended. He had strong hopes that by consolidating the two societies in one we will get better results; we will get more harmonious co-operation. Labor organizations in every field band themselves together for successful work.

One reason that there was so little interest in the national association on the part of the profession, he thought, was because of the lack of thorough work and satisfactory organization in these national bodies. Instead of there being from seven to eight sections, there should be only one section to report at each meeting, or at most two, and their report should be the result of several years' work. Under the present order of things chairmen of different sections go to the meetings without adequate preparation, and the results are so unsatisfactory that it is no wonder the attendance and membership fall off. Dr. Crouse then went into the claims of the Dental Protective Association. He stated that up to the present time it had three thousand two hundred members, and that it should have at least ten thousand. Its work had been worth millions of dollars to the profession, and was always useful as a protection against schemers who would rob the dentists.

He had not urged the union of the Southern Dental Association and the American Dental Association, because of the feeling which would prevent him urging any one to become a member of his family who was unwilling to do so. There are some dentists who always seem to feel that they must oppose any measure favored by other dentists.

During the war it was not easy for the dentists of the North and of the South to hug each other, but now, thirty-two years after the war, it ought to be possible.

Dr. Williams Donnally, of Washington, thanked Dr. McManus for reading the paper, and thought it was very important at this time that the profession should have their attention called to the facts presented in the paper. There seems to be a well-founded opinion that the American Dental Association is not doing the work that it should, and that another association, with the energies of both the old ones, would do the needed work better.

Dr. E. P. Beadles, of Danville, Va., was much interested in the paper, and thought it would be a good thing if it could be brought to the attention of every dentist in the country. He asked Dr. McManus if a dental college had ever enforced the law, or clause in the diploma, that the diploma should be revoked in case the recipient was guilty of unprofessional conduct.

Dr. B. Holly Smith said that, as a teacher in a dental college, he would be very glad to have it in the power of the colleges to take a diploma from a graduate who practices contrary to the code of ethics, but that he had had the advice of one of the best constitutional lawyers in his state that to attempt such a thing would be absurd. The societies can have some control over the practitioners, but the colleges none at all.

Dr. Beadles said that his diploma was written in Latin, and it

had been a long time since he had read it, but his impression was that it contained a clause that it would be revoked for unprofessional conduct, though he might be mistaken.

Dr. Alonzo Boice, of Philadelphia, said in reference to dental patents that there was no way of knowing what the rubber patents had cost the dentists, but the amount was enormous. The Goodyear patent was for making a rubber plate, and the profession paid a license on this; and then the Cummings patent for fastening teeth to a rubber plate by pins. This license was fifty dollars a year and upward. Now comes another company not having one, but twenty patents. Their license would be not less than one hundred dollars a year. This, as there are about twenty thousand dentists in the United States, would amount to two million dollars a year. The Dental Protective Association has absolutely saved this sum to the profession, and it seemed to him that every self-respecting dentist should join the association and contribute his part toward the expense of carrying on the work.

Dr. D. D. Smith, of Philadelphia, said that the teaching of Dr. McManus's paper was that the evolution of professional life was not so much the effect of the college education, nor from the requirements of the colleges as to preliminary education, as to the after-conduct of the graduate and his life in association work. There is much force in this reasoning. The position taken in regard to dental education and the necessity of a higher standard of preliminary education is questionable. Not that he would depreciate any effort for the furtherance of education, but there are many of the best men in the profession to-day, men who have taken positions of prominence in the professional world, who have demonstrated their ability as dentists and who have been a credit to the profession in every way, who began the practice of dentistry without academic education or collegiate training, but who sprang from the lower walks of life. Marshall H. Webb, for instance, one of the best men this country ever produced. No man in the United States ever lived a more thoroughly conscientious professional life, nor served his patients with more faithful or skillful service. This man was graduated from the Philadelphia Dental College after attendance for a single term of about three and a half months.

The colleges have no right to revoke a diploma, and it would be an absurdity to insert such a clause in the diploma. The colleges should instill into the minds of the graduates that they are professional men, and teach them their obligations as such. The members of the associations should then take up the work, get the young practitioner into the association, and make him feel that he owes it to himself and his professional standing to live so he may retain the respect of his fellows.

Now, where does Dr. Crouse's association come in? These men will have a pecuniary interest in such an association, and feel it a duty as well as a privilege to join it. In every way joining such an association will tend to ennoble and advance every member. Beyond a question, the ten thousand members asked for should be

found. They owe it to themselves to join it. I feel myself under very great obligation to the Dental Protective Association, for not three weeks before I received an invitation to join the Protective Association a man came into my office and asked me to take out a license from the International Tooth Crown Company. I refused emphatically to take out such a license, and told him I would leave the dental profession rather than do it. He left, saying significantly that he would see about it later. I am thankful that within a short time I received the circular from the Protective Association. I immediately sent my check, and since then I have had a feeling of security worth many times the amount of the ten dollars which it cost me to join.

Dr. MARSHALL SMITH, of Baltimore, said that in his estimation there had been nothing in the last ten years so beneficial to the dental profession as the establishment of the Protective Association.

The subject was passed, and the convention adjourned till next morning.

(To be continued.)

VERMONT STATE DENTAL SOCIETY.

AT the twenty-first annual meeting of the Vermont State Dental Society held at Montpelier, March 17-19, 1897, the following officers were elected for the ensuing year: Dr. C. S. Campbell, St. Albans, president; Dr. J. A. Robinson, Morrisville, first vice-president; Dr. K. L. Cleaves, Montpelier, second vice-president; Dr. T. Mound, Rutland, recording secretary; Dr. Grace L. Bosworth, Rutland, corresponding secretary; Dr. W. H. Munsell, Wells River, treasurer; Dr. H. Turrill, Rutland, Dr. C. W. Steele, Barre, Dr. J. E. Taggart, Burlington, executive committee; Dr. G. W. Hoffman, White River Junction, state prosecutor.

The next meeting to be held at Rutland, the third Wednesday in March, 1898. THOMAS MOUND, *Rec. Secretary.*

CHICAGO DENTAL SOCIETY.

FOLLOWING is the list of officers of the Chicago Dental Society for 1897-98, elected at the annual meeting, held in Columbus Memorial Building, Tuesday evening, April 6, 1897: A. H. Peck, president; D. M. Gallie, first vice-president; G. T. Carpenter, second vice-president; E. Ma Whinney, recording secretary; Geo. B. Perry, corresponding secretary; E. D. Swain, treasurer; J. N. Crouse, member board of directors; D. M. Cattell, A. W. McCandless, J. J. Whaley, board of censors.

GEO. B. PERRY, *Corresponding Secretary.*

DENTAL COLLEGE COMMENCEMENTS.

PHILADELPHIA DENTAL COLLEGE.

THE thirty-fourth annual commencement exercises of the Philadelphia Dental College were held at the Academy of Music, Philadelphia, Pa., on Friday, April 2, 1897, at 12 o'clock M.

The address to the graduates was delivered by Professor S. H. Guilford, A.M., D.D.S., Ph.D., and the valedictory address by Lincoln A. Timerman, D.D.S.

The number of matriculates was two hundred and sixty-nine.

The degree of D.D.S. was conferred on the following graduates by Ex-Governor James A. Beaver, president of the board of trustees:

NAME.	STATE OR COUNTRY.
Gustav N. Aasgard	Norway.
George F. Ames	California.
George D. Arnum	Canada.
George S. Bailey	Pennsylvania.
Arthur G. Beach	Connecticut.
George L. Bean	California.
Louis F. Bean	Massachusetts.
E. M. Bernardy	Pennsylvania.
Edward B. Bowker	Australia.
Wilber H. Brackett	Maine.
Emma L. Brecheisen	Ohio.
John D. Brennan	Pennsylvania.
Albert C. Bridgland	Canada.
F. T. Bridgland	Canada.
William E. Brown	New York.
William J. Brown	Canada.
William H. Bulmer	Canada.
Mitchell H. Burke	Massachusetts.
Dan U. Cameron	Ohio.
Wm. M. Cameron	Canada.
Jerome C. Capron	New York.
William S. Carnes	Ohio.
William A. S. Casey	Canada.
Isaac P. Cliff	Australia.
Centennella Collins	Pennsylvania.
John G. Colridge	Canada.
William R. Conner	Canada.
Edward J. Counter	Australia.
Walter W. Crate	New Jersey.
S. A. Crowther	Pennsylvania.
George J. De Long	Pennsylvania.
W. E. Dickson	Massachusetts.
Daniel J. Dixon	Massachusetts.
Frank J. Doland	Massachusetts.
W. H. Dolman	California.
Joseph R. Dunbar	Pennsylvania.
Harry C. Easton	Pennsylvania.
Henry A. Eltz	Pennsylvania.
Frank J. Erbe	Connecticut.
R. McE. Erwin, Jr	Pennsylvania.
Harry E. Fitch	New York.
Stanley Fitz Stubbs	Australia.
John T. Frederick	Pennsylvania.
J. C. Gilbertson	California.
George M. Glenney	Canada.
Edwin A. Goodwin	Canada.
Herman J. Graham	New York.
Edward P. Grove	Pennsylvania.
Louis E. Habegger	Pennsylvania.
John W. Hall	England.
Louis W. Hart	Maine.
Wm. H. Harvey	California.
Charles P. Heales	Canada.
Samuel E. Heilig	Pennsylvania.
W. T. S. Hinder	Australia.
James H. Holtham	Pennsylvania.
Willard Hoster	New York.
F. H. Houck	Oregon.
Cromwell Ironside	New Jersey.
James W. Jackson	New York.
Willis H. Jackson	New York.
John A. Johnson	Pennsylvania.
Walter M. Johnson	Canada.
Chas. H. Kaufman	Illinois.
Ralph H. Keeler	Connecticut.
George W. Kleiser	California.
E. E. Kinney, M.S.	Canada.
C. A. Kirkpatrick	Canada.
Edward N. Lambly	Canada.
Frank C. Lewis	Pennsylvania.
Chas. T. Lipscomb	South Carolina.
F. McL. Longley	Georgia.
Edward N. Lord	New York.
Burt A. Loveless	New York.
Frank W. Lowrey	Maine.
Jas. W. McClune	Pennsylvania.
E. M. McConaughy	Iowa.
J. E. McIlwraith	Rhode Island.
F. H. McLaughlin	Canada.
Peter E. Mackay	Canada.
Armand G. Mader	Pennsylvania.
M. W. Maloney	Massachusetts.
John J. Mathias	Pennsylvania.
John J. Mattison	New York.
Fred. E. Maxfield	Maine.
James J. Mills	Pennsylvania.
Stuart McL. Milne	Canada.
Hal H. Mize	Missouri.
Lloyd G. Morgan	Oregon.
M. W. Morris	Canada.

NAME.	STATE OR COUNTRY.
Mary A. Morrison	New Jersey.
Herbert S. Nelson	Pennsylvania.
Wm. S. O'Brien	New York.
Wm. E. O'Reilly	Massachusetts.
Adin T. Parsons	Australia.
E. A. Pennington	New Jersey.
Albert E. Phin	Canada.
S. L. Pickles	Canada.
Chas. H. Pinkham	New Jersey.
Catharine S. Platt	New Jersey.
M. Propper, M.D.	Hungary.
Woodie S. Pugh	Alabama.
Maurice W. Quinn	Massachusetts.
Richard H. Rivers	Canada.
Albert L. Roat	Pennsylvania.
Wm. F. Roberts	Rhode Island.
Moses N. Roe	New York.
Chas. S. Roever	Maryland.
E. S. Rosenbluth	Connecticut.
E. Schnöll, M.D.	Austria.
A. Schreier, M.D.	Austria.
Herbert W. Shaw	Massachusetts.
James M. Shay	New York.
Wm. P. Smedley	Colorado.
David A. Smith	New York.
Robert E. Smith	California.
W. F. Sommers	Pennsylvania.
Joseph W. Steiner	Roumania.
T. C. Stellwagen, Jr.	Pennsylvania.
Arthur J. Sullivan	Indiana.
Frank E. Thomas	Iowa.
Edna M. Thompson	Ohio.
Mattie S. Tilton	New York.
L. A. Timerman	New York.
George S. Wagner	Pennsylvania.
J. S. Ware	New Jersey.
George L. Webb	Pennsylvania.
Frank W. Webster	Canada.
E. S. White, B.S.	North Carolina.
P. B. Whitmarsh	Rhode Island.
Arthur D. Williams	Canada.
Walter J. Williams	Canada.
Reid A. Wilson	Pennsylvania.
Ralph A. Wood	Maine.
Ora E. Zuill	Bermuda.

University of Buffalo—Dental Department.

The Dental Department of the University of Buffalo held its fifth annual commencement exercises in connection with the Departments of Medicine and Pharmacy, in Music Hall, Buffalo, N. Y., on the evening of April 27, 1897.

The whole number of students matriculated for the term was two hundred and twenty-two.

The Chancellor conferred upon the following named students the degree of Doctor of Dental Surgery:

Bertram J. Baker.
Jarvis Barraclough.
Harry E. Barnhardt.
Frederic S. Belding.
Alfred M. Borton.
Warren J. Boyd.
William P. Brinton.
Colin Cameron.
Alfred R. Cook.
Alfred B. Cairnes.
Harry M. Clark.
Charles S. Deuel.
Jay H. Dower.
John V. Flaherty.
James V. Faulkner.
Ferdinand J. Freitag.
Francis L. Greene, Ph.B.
Beverly C. Guile.
Frank A. Gough.
Frederick D. Greene.
Leverett L. Hamilton.
Perry F. Hepp.
Abram L. Hipwell.
George T. Head, M.D.
George T. Hickelton.
Carey E. Janes.
Henry H. Ketcham.
Van A. Lacy.
George T. Lord.
William C. Luetti.
Harry B. Lyon.
Arthur B. Magee.
Charles J. McClure.
John F. McPhee.
Henry S. Merkley.
Theodore P. Moyer.
William H. Marks.
William S. McFarlane.
Frank C. McPherson.
William D. Moss.
Robert Muir.
Frederic B. Niles.
Leonard E. Noble.
Henry R. O'Brien.
Seth T. Paine.
Charles B. Payne.
Charles H. Plumstead.
William T. Potter.
Harry P. Rawson.
Louis St. G. Rickards.
Wilbur S. Rose.
Clarence L. Roys, Ph.B.
Samuel Rowan.
Rolla Sabine.
Frank W. Smith.
Daniel G. Simmonds.
Howard E. Stone.
Harry V. Tefft.
John M. Tanzer.
Anna M. Thrane.
Frank H. Underwood.
Charles H. Whitlock.
Melrose W. Wright.
George D. Wood.
Clarence R. Waldron.
Harry L. Whipple.
Edward A. Wood.

Chicago College of Dental Surgery.

The fifteenth annual commencement exercises of the Chicago College of Dental Surgery (Dental Department of Lake Forest University) were held in Central Music Hall, Chicago, Ill., on Thursday, April 1, 1897, at 2 P.M.

The doctorate address was delivered by L. L. Skelton, A.M., M.D., and the valedictory by Enoch A. Reyher, D.D.S., of the graduating class.

The degree of D.D.S. was conferred on the following graduates by Truman W. Brophy, M.D., D.D.S., LL.D., president of the college:

Oliver S. Applegate.
Alfred E. D. Austin.
James A. Atchison.
Elmer C. Burkholder.
Frank C. Babcock.
Edwin A. Billig.
David N. Boatner.
Edgar R. Bennecke.
William P. Brown.
Carl DeW. Bates.
Charles H. Broadway.
Ernest O. Bloomer.
Bertis B. Bemis.
Washington Buchanan.
Evan H. Bryan.
James B. Baker.
Henry Brown.
Guy T. Brearly.
William Bebb.
Charles H. Blackburn.
Benjamin F. Blosser.
Leon G. Borst, M.D.
Claude A. Costley.
Perry L. Cambell.
George A. Cutteridge.
Charles H. Cutteridge.
Franklin O. Cates.
Lorwin N. Cates.
Frederick H. Colter.
Edwin M. Clotfelter.
Frank B. Clemmer.
Howard S. Clemmer.
Martin Christensen.
Clifford W. Carr.
Gustav E. Cleophas.
John E. Clark.
John W. Corbin, Ph.C.
Otis E. Chappell.
Charles W. Cotton.
Charles A. Christin.
Harry C. Devereaux.
Harry L. Dickinson.
John S. Donald, B.Sc.
William E. Dunbar.
Ernest G. Downey.
Frederick De Bruin.
James O. Dunn.
C. F. E. Dreibrodt.
Blake W. Dutton.
Milton Eisenstaedt.
Charles D. Eversole.
Anthony L. Entsminger.
Solomon B. Friend.
Henry E. Fowler.
Harry J. Glasgow.
Haakon L. Gerner.
Warren A. Giddings.
Guy B. Harvey.
Fred. L. Hasbrouck.
S. R. Harrison, Ph.B.
Charles N. Hoagland.
Grier Hanson.
Irving J. Herrick.
Robert M. Hettinger.
Harold H. Hayes.
Thomas H. Hood.
Morris L. Hilton.
Robert H. Huffman.
Louis S. Irgens, Ph.G.
Charles B. Ingram.
John H. Johnston.
Charles A. Kaye.
August F. Kemper.
Willett E. Kyle.
Bert A. Kimball.
Robert F. Livingston.
Alfred W. Lane.
Henry C. Loppenthien.
Wm. G. Loppenthien.
W. B. Lockwood, B.S.
Mahlon R. Lindley.
George A. Miller.
Charles G. Morrell.
George E. Mason.
Louis H. Matter.
Valentine Massman.
Martin D. Molitor.
John L. Malone.
Francis N. Maginnis.
Frederick J. Martin.
Harry I. Miner.
Lantson D. Mills.
Thomas S. McAyeal.
Erwin J. McKee.
G. O. Orr, D.V.S.
Edward F. O'Donnell.
Fred. B. Olwin.
Maurithz W. Olson.
James H. Pearson.
William L. Pank.
Harry H. Porter.
Arthur I. Porges.
Harrie A. Penfield.
Joseph C. Pasqueth.
Joseph L. Pease.
Price W. Rood.
Charles A. Raver.
F. H. Roberts.
Stanley Rea.
Charles F. Rodolf.
Edward B. Rhinehart.
Enoch A. Reyher.
Henry W. Rich.
George E. Stevenson.
Harry T. Silver.
Henry S. Smith.
Emil T. Strongquist.
John F. Sweeney.
John M. Singler.
Oscar I. Spitz.
Brace D. Schrantz.
Thomas E. Stoddert.
Henry D. Single.
Burton Schrock.
Josiah B. Solomon.
W. M. Standish, D.V.M.S
Joseph Satory.
Hezekiah M. Thatcher.
Raymond O. Trenholm.
Delos B. Terry.
Fred. A. Tate.
Wm. McC. Terry.
Ross S. Vedder.
Edgar R. Weart.
Lewis E. Wood.
Martin Williams.
John L. Wetzel.
Robert H. Wagner.
George W. Wilson.
Richard T. Woollard.
Julian E. Young.
John M. Yahres.

UNIVERSITY OF MARYLAND—DEPARTMENT OF DENTAL SURGERY.

THE annual commencement exercises of the Department of Dental Surgery of the University of Maryland were held in the Lyceum Theater, Baltimore, Md., on Wednesday, March 31, 1897, at 8 o'clock P.M.

The address to the graduates was delivered by Rev. M. B. Wharton, D.D., and the class oration by H. C. Raoul Breault, D.D.S., of Connecticut.

The number of matriculates for the session was two hundred and ten.

After the reading of the mandamus by Professor Ferdinand J. S. Gorgas, dean, the degree of D.D.S. was conferred on the following graduates by Hon. John P. Poe, acting provost of the university:

NAME.	STATE OR COUNTRY.
Albert A. Aiken	Texas.
Fred. S. Anderson	New Brunswick.
Edgar J. Applewhite	Virginia.
Charles E. Ayres	Pennsylvania.
Albert D. Baker	Maryland.
J. H. Besore	Maryland.
Samuel D. Bodine	Pennsylvania.
Walter G. Boyd	Maryland.
H. C. R. Breault	Connecticut.
John H. Bushong	Virginia.
E. A. Charbonnel	Washington.
Clarence E. Collins	Maryland.
James L. Duff	Canada.
Arthur P. Farley	Connecticut.
John W. Faucette	North Carolina.
Eugene Finnegan	New York.
Newton F. Foote	New York.
J. McC. Foreman	Pennsylvania.
A. H. Frith	Bermuda.
John Gardner	Maryland.
Arthur P. Gordy	Georgia.
W. G. Gould	Connecticut.
C. LeR. Hartman	Pennsylvania.
Chas. F. Heisler	Pennsylvania.
Robert L. Henry	Georgia.
J. G. Hoffman	Virginia.
Marion N. King	Virginia.
J. M. Macdonald	New Zealand.
Daniel T. Maloney	Connecticut.
Chesley Martin	Virginia.
D. E. McConnell	South Carolina.
C. H. McNutt	Nova Scotia.
Robert W. Morton	Pennsylvania.
Wirt H. Moseley	Virginia.
Abram V. Mowel	New York.
R. M. Muir	Canada.
R. C. Nicodemus	Maryland.
R. G. Norfleet	Virginia.
Samuel P. Norris	North Carolina.
Henry I. O'Connor	Georgia.
H. N. Pheneger	Pennsylvania.
Thomas L. Posey	Kentucky.
R. R. Reiff	Pennsylvania.
James L. Rogers	Tennessee.
F. S. Robinson	Florida.
Louis H. Russell	South Carolina.
Percy Russell	Maryland.
W. C. Seaton, Jr.	New York.
Walter O. Stack	Delaware.
J. R. Steele	Pennsylvania.
Stanley Steele	Maryland.
Max Stein	Russia.
Charles C. Switzer	New York.
Elisha S. Taylor	Maryland.
Fred. R. Thomas	Nova Scotia.
Alexander Tribble	Missouri.
Patrick J. Vaughan	Georgia.
J. Somes Watts	Canada.
Julius Weinberger	New York.
F. B. Weller	New York.
A. A. Williams, Jr.	Georgia.
S. B. Wrightson	Maryland.

PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

THE forty-first annual commencement exercises of the Pennsylvania College of Dental Surgery were held at the Academy of Music, Philadelphia, Pa., on Thursday evening, April 1, 1897.

The address to the graduates was delivered by Professor A. P. Brubaker, M.D.

The number of matriculates for the session was three hundred and sixty-two.

The degree of D.D.S. was conferred on the following graduates by I. Minis Hayes, M.D., president of the college:

NAME.	STATE OR COUNTRY.
J. A. Anderson	New York.
Jos. H. A. Barretto	Pennsylvania.
Earle T. Beale	Pennsylvania.
E. J. Beers	Pennsylvania.
Adolphus Belber	Pennsylvania.
H. M. Boyer	Pennsylvania.
D. N. Booth	New Hampshire.
Robt. B. Bryant	New York.
Otto F. Brauns	Wisconsin.
Geo. C. Byrne	Pennsylvania.
W. M. Campbell	New York.
J. G. Cannon	Delaware.
Frank Carroll	Maryland.
R. C. Chambers	Pennsylvania.
G. O. Challinor	Pennsylvania.
J. Roy Cherry	Pennsylvania.
Annie F. Colley	Maryland.
S. C. Coleman	Canada.
J. D. Coney	Pennsylvania.
H. A. Coykendall	New Jersey.
Jos. F. Crandall	Pennsylvania.
R. P. Eason	Georgia.
Geo. W. Fleming	Pennsylvania.
Edwin D. Forrest	New Hampshire.
Dionsio de Frias	San Domingo.
C. H. Fraiser	New York.
Lillian M. Gale	Wisconsin.
R. G. Garvin	Ireland.
T. E. Gifford	New Jersey.
W. S. Hallett	Delaware.
R. J. Hawkey	Canada.
C. E. Hart	Ohio.
Wm. Haverkost	Pennsylvania.
A. E. Haynen	Canada.
A. M. Hendershot	Ohio.
W. S. Herr	Pennsylvania.
E. S. Hine	New Jersey.
Francis T. Houston	Ohio.
Otto Homberger	Switzerland.
J. Max Hootman	Pennsylvania.
J. H. Kalbach	Pennsylvania.
Frank Kampe, Jr.	Pennsylvania.
Silas B. Keith	Massachusetts.
Arthur Koester	Germany.
John A. Lambertus	Canada.
H. H. Lattimore	Georgia.
W. J. Lawson	Ohio.
F. C. Leffmann	Pennsylvania.
R. W. Livingston	Pennsylvania.
E. S. McDonald	Ohio.
J. W. Manon	Pennsylvania.
W. J. Martin, M.D.	Pennsylvania.
R. Mathison, Jr.	Canada.
G. de Mazarredo	Cuba.
F. L. Mills	Pennsylvania.
R. W. Morgan	Pennsylvania.
T. W. Morgan	Pennsylvania.
J. A. Moran	Canada.
J. Fred. Moore	Pennsylvania.
L. J. Moulton	New Hampshire.
Jas. V. Mulford	Ohio.
Yasu Nakamura	Japan.
Maude Nicholson	Pennsylvania.
A. J. Norton	New York.
H. J. Oldstein	Pennsylvania.
L. D. Palmer	Pennsylvania.
Geo. F. Paine	New York.
Wilbur M. Peirce	Pennsylvania.
Robt. Purvis	Wash'g'n., D. C.
G. B. Renfrow	Kentucky.
J. C. Salvas	Wisconsin.
H. S. Sanders	Pennsylvania.
Wm. C. Scott	Pennsylvania.
H. L. Schooley	Pennsylvania.
R. Ogden Shoop	Ohio.
R. G. Skillen	California.
R. A. Smith	Pennsylvania.
H. T. Smith	Pennsylvania.
Thos. M. Smith	New Jersey.
H. W. Souders	Pennsylvania.
M. W. Sommer	Pennsylvania.
C. Luco Solar	Chile.
E. O. Spalding	New Hampshire.
L. W. Strong	Connecticut.
A. H. Tait	Jamaica.
S. E. Tate	Pennsylvania.
C. K. Taylor	Pennsylvania.
M. J. Terry	Pennsylvania.
J. C. Todd	Pennsylvania.
W. E. Towne	Massachusetts.
Harry Van Allen	Canada.
J. Y. Walker	Ohio.
Oscar Wayne	Pennsylvania.
V. R. Westervelt	New York.
H. Belle Whitcomb	Pennsylvania.
A. R. White	New Jersey.
Jas. G. Whiteside	Ohio.
A. L. Wilson	Canada.
W. C. Wilson	Pennsylvania.
Tullus Wright	Pennsylvania.
Fred. Zimmerman	Switzerland.

SOUTHERN MEDICAL COLLEGE—DENTAL DEPARTMENT.

THE tenth annual commencement exercises of the Dental Department, Southern Medical College, were held at the Grand Opera House, Atlanta, Ga., on Tuesday evening, March 23, 1897.

The valedictory address was delivered by J. H. Foster, of Troy, Ala., and the annual oration by the Hon. Albert Cox, Atlanta, Ga.

The number of matriculates for the session was eighty-one.

The degree of D.D.S. was conferred on the following graduates:

J. L. Adams.....Georgia.	D. D. Beekman.....Florida.
R. W. Blackstone.....Wisconsin.	E. R. Baker.....Georgia.
G. W. Collins.....Georgia.	F. E. Clark.....California.
D. L. Farmer.....Georgia.	J. H. Feagans.....South Carolina.
J. H. Foster.....Alabama.	M. W. Gage.....Mississippi.
H. N. Gallaher.....Georgia.	Otis Gilbert.....Georgia.
S. W. Harris, Jr.....Georgia.	R. L. Hunter.....Georgia.
Chas. W. Lokey.....Alabama.	J. A. Martin.....Louisiana.
A. L. McArthur.....Georgia.	Wip Robinson.....Tennessee.
J. W. Robinson.....Maine.	

Kansas City Dental College.

The fifteenth annual commencement exercises of the Kansas City Dental College were held in the Coates Opera House, Kansas City, Mo., on Wednesday evening, March 31, 1897.

The salutatory was delivered by Claude Backus, D.D.S.; the faculty address by Walter S. Wheeler, M.D.; and the annual address by Dr. Garrett Newkirk, of Chicago, Ill.

The degree of D.D.S. was conferred on the following graduates by Alton H. Thompson, D.D.S., president of the faculty:

NAME.	STATE.	NAME.	STATE.
Arnelle D. Andrews	Iowa.	Thaddeus S. Kelly	Missouri.
Claude Backus	Illinois.	Curtis L. Larmer	Missouri.
Guy C. Colman	Missouri.	Frank E. Leviston	California.
William E. Cutler	Kansas.	Cullen B. McCarty	Iowa.
Wesley R. Crawford	Kansas.	William A. Moore	Missouri.
Chas. W. Chalfant	California.	William H. Nipps	Missouri.
Freeman Davis	Illinois.	John W. Netherton	Missouri.
James P. Dawson	Missouri.	Simon G. Numbers	Kansas.
Howard S. Engle	Iowa.	Robert H. Pendleton	Missouri.
H. W. Fessenden	Kansas.	Thos. E. Purcell	Kansas.
Roger C. Fields	Missouri.	Clyde M. Pancoast	Nebraska.
James H. Graham	Texas.	John A. Reily	Missouri.
Mark D. Gwinn	Missouri.	Elby D. Rogers	Kansas.
Clinton T. Hart	Kansas.	George Ruddell, Jr.	Kansas.
Chas. L. Hopkins	Missouri.	Edward H. Stiles, Jr.	Missouri.
A. P. Hults	Kansas.	Wm. S. T. Smith	Missouri.
Shelley K. Johnson	Iowa.	George C. Seyster	Kansas.
James T. Keith	Kansas.	John T. Wilson	Missouri.
Geo. H. Kittell	Kansas.	Elijah G. Winkler	Kansas.
Leonard D. Koger	Missouri.		

Ohio College of Dental Surgery.

The fifty-first annual commencement exercises of the Ohio College of Dental Surgery (Department of Dentistry of the University of Cincinnati) were held at the Odeon, Cincinnati, Ohio, on Tuesday, April 6, 1897, at 8 o'clock P.M.

The annual address was delivered by Rev. Warren G. Partridge, and the class address by Shotwell H. Roff, D.D.S.

The number of matriculates for the session was two hundred and twelve.

The degree of D.D.S. was conferred on the following graduates by Dr. Frank A. Hunter, president of the board of trustees:

NAME.	STATE.	NAME.	STATE.
E. A. Baldwin	Ohio.	Claude E. Keeney	West Virginia.
E. F. Barrington	Ohio.	J. H. Kendall	Ohio.
Charles C. Boggess	Ohio.	W. O. Kuechler	Pennsylvania.
John A. Bouvy	Kansas.	John H. Marvin	Pennsylvania.
Harry C. Bowen	Ohio.	Alviere Milligan	Ohio.
H. B. Buchanan	Ohio.	Jas. M. Monfort	Ohio.
N. DeV. Chamberlin	Ohio.	Orlando C. Moon	Ohio.
Philip S. Chesnut	Ohio.	Miss E. E. McKallip	Pennsylvania.
Hugh R. Conklin	Ohio.	M. G. Phillips	Ohio.
B. L. Conway	Ohio.	Jas. T. Ralston	Kentucky.
Frank A. Dille	Colorado.	F. Robinson	Pennsylvania.
Clinton H. Doss	Illinois.	W. E. Robinson	Ohio.
Ralph W. Ernest	Ohio.	Shotwell H. Roff	Ohio.
Clifford T. Eskey	Pennsylvania.	Albert R. Riggs	Ohio.
Wm. T. Embree	Missouri.	August Schwartz	Ohio.
George Fischer	Pennsylvania.	Joseph C. Sheets	Ohio.
Homer C. Foster	Ohio.	A. H. Sherick	Ohio.
John Jay Foster	Nebraska.	Harry A. Smith	Ohio.
Mrs. N. E. Freeman	Indiana.	David Stern	Ohio.
Edgar E. Heizer	Ohio.	H. H. Truesdell	Ohio.
Emil L. Haring	Indiana.	John W. Taylor	Kentucky.
Thomas A. Hyer	Ohio.	D. P. Turner	Ohio.
John F. Herdliska	Ohio.	F. R. VanMeter	Ohio.
Warren B. Harris	Indiana.	F. M. Moulton	Ohio.
Lewis T. Ivins	Ohio.	Benj. J. Wolf	Ohio.

COLUMBIAN UNIVERSITY—DENTAL DEPARTMENT.

THE tenth annual commencement exercises of the Dental Department of the Columbian University were held in the Columbia Theater, Washington, D. C., on Tuesday evening, May 4, 1897.

The address to the graduates was delivered by Professor J. Hall Lewis, and the valedictory by Eppa H. Coumbe, D.D.S.

The degree of D.D.S. was conferred on the following graduates by B. L. Whitman, D.D., president of the university:

NAME.	STATE.	NAME.	STATE.
Wm. F. Ankeney	Maryland.	Geo. E. Hurley	Massachusetts.
D. A. Binkert	Illinois.	James G. Haskell	Kentucky.
E. M. Carter	Dist. of Columbia.	F. H. Waite, Ph.D.	Maryland.
Eppa H. Coumbe	Virginia.	H. A. Wiltberger	Pennsylvania.
T. B. Cochran	Virginia.	Elmer F. Yount	Dist. of Columbia.

Richard Washington, M.D., Virginia.

DENTAL SOCIETY ANNOUNCEMENTS.

AMERICAN DENTAL ASSOCIATION.

THE thirty-seventh annual session of the American Dental Association will be held at Old Point Comfort, Va., commencing at 10 A.M. on Tuesday, August 3, 1897. GEO. H. CUSHING, *Recording Secretary.*

Pennsylvania State Dental Society.

The twenty-ninth annual meeting of the Pennsylvania State Dental Society will be held at Glen Summit, Pa., on July 6, 7, and 8, 1897. A full and interesting program has been arranged, and a cordial invitation is extended to all. Ticket orders for reduced rates can be had over the following roads: Pennsylvania, Philadelphia and Reading, Lehigh Valley, and Central Railroad of New Jersey, by stating over which road you wish to travel and addressing

Dr. V. S. Jones, *Cor. Sec'y.*,
Bethlehem, Pa.

Pennsylvania State Dental Examining Board.

The Pennsylvania State Dental Examining Board will meet at the Glen Summit House, Glen Summit, Luzerne county, Pa., on Tuesday, July 6, 1897.

Henry Gerhart, *President,*
Lewisburg, Pa.
J. C. Green, *Secretary,*
West Chester, Pa.

New Jersey State Dental Society.

The twenty-seventh annual meeting will be held in the Grand Atlantic Hotel, Atlantic City, commencing on Wednesday morning, July 21, 1897, and continue in session two days. Seventeen papers by eminent men will be read upon interesting topics pertaining to the profession. Clinics of every description have been provided; four large rooms on the ground floor available for exhibits, with 110-volt current for electrical exhibits.

Hotel rates, $2.50 per day up. Accommodations for seven hundred guests.

Friends from the West and East contemplating attending the American Dental Association will be able to attend this meeting and take the Old Dominion line of steamers from New York, Thursday, July 29, at 3 P.M., at an excursion rate of $11.20, or the Pennsylvania Railroad, rate of one and one-third fare.

Charles A. Meeker, D.D.S., *Secretary,*
29 Fulton street, Newark, N. J.

The Committee on Prosthetic Dentistry of the New Jersey State Dental Society desire all those having anything new in the department to exhibit the same at the annual meeting to be held in Atlantic City July 21, 22, 23. Intending exhibitors should notify the committee immediately, in order that their names may be placed on the program.

Chas. S. Hardy, *Secretary,*
Summit, N. J.

New Jersey State Dental Examinations.

The Dental Examining Board of New Jersey will meet at the Commission rooms, No. 88 Broad street, Elizabeth, N. J., on Tuesday, July 13,

1897, for the examination of candidates for license to practice dentistry. All applications for examination must be in the hands of the secretary on or before June 30. Blanks and instructions sent on application to the secretary.

G. CARLETON BROWN, *Secretary*,
No. 88 Broad street, Elizabeth, N. J.

GEORGIA STATE DENTAL SOCIETY.

THE twenty-ninth annual meeting of the Georgia State Dental Society will be held at Warm Springs, Ga., June 8-12, 1897. The following are officers of the society: J. A. Chapple, president, Atlanta; H. D. Wilson, first vice-president, Bainbridge; M. N. Mixon, second vice-president, Rome; H. A. Lowrance, treasurer, Athens; S. H. McKee, recording secretary, Americus: O. H. McDonald, corresponding secretary, Atlanta. All dentists out of the state cordially invited.

INDIANA STATE DENTAL ASSOCIATION.

THE Indiana State Dental Association will hold its thirty-ninth annual meeting in Fort Wayne, commencing at 10 o'clock A.M. June 29, 1897, and continuing through three days. Members of the profession are cordially invited to be present and participate in the proceedings.

Monday, June 28, at 2 P.M., the State Board of Dental Examiners will meet in the New Aveline Hotel, to examine all applicants coming before it.

M. A. MASON, D.D.S., *Secretary*.

COLORADO STATE DENTAL ASSOCIATION.

THE regular annual meeting of the Colorado State Dental Association will be held June 8, 9, and 10, 1897, at Colorado Springs. The feature of this meeting will be that dental subjects under discussion shall be demonstrated by clinics.

J. S. JACKSON, *Corresponding Secretary*,
1515 Stout street, Denver, Col.

TENNESSEE STATE DENTAL ASSOCIATION.

THE meeting of the Tennessee State Dental Association has been changed from Lookout Mountain to Nashville, on July 6, 7, 8, and 9, 1897, in order to give members and visitors the opportunity of attending the Exposition. All dentists in good repute are cordially invited to meet with us.

U. D. BILLMEYER, *President*,
B. D. BRABSON, *Secretary*,
Knoxville, Tenn.

National Association of Dental Examiners.

The fourteenth annual session will be held at Old Point Comfort, Va., commencing Friday morning, July 30, at 10 A.M., and continuing in session Saturday, July 31, and Monday, August 2. The sessions will be held in the Hotel Chamberlain.

The Hotels Hygeia and Chamberlain will give rates of $2.50 per day two in a room, $3.50 per day one in a room.

Fares on all the trunk lines one full fare and one-third, good for the sessions of the American and Southern Dental Associations.

The Old Dominion Steamship Company, Pier No. 26 North River, New York, will sell excursion tickets, including meals and berths, $11.20, sailing every day, 3 P.M., from Thursday, July 29, using the name of the secretary.

Let every state send its delegates.

Charles A. Meeker, D.D.S., *Secretary,*
29 Fulton street, Newark, N. J.

EDITORIAL.

The Report of Section II of the American Dental Association.

During the period when the transactions of the last annual meeting of the American Dental Association were being published in this journal, the demands upon our space were such as to make it necessary to omit certain of the matter which appeared later in the completed volume of the transactions. Among other matters the report of the Committee on Dental Education was thus crowded out.

Although that report has been published in the Transactions, we deem it of sufficient importance and general interest to warrant the republication of its essential features here, and especially as the volume of Transactions practically reaches only the somewhat limited circle of readers comprised in the membership list of the American Dental Association.

The report deals statistically with the dental educational institutions of this country, their number and classification, and the volume of their output of students for the year, as well as the number of students in attendance. The classification is as follows:

1. Dental colleges in active operation.
2. Dental colleges organized during the past year.
3. Corporations conferring the dental degree, but regarding which no further information is at hand.

The following is the number of "Matriculants," "Students in Attendance," and "Graduates," as reported by each school for the session of 1895-96:

	Matriculants.	Attendance.	Graduates.
Alabama :			
*Birmingham Dental College, Birmingham...	36	36	6
California :			
*University of California, College of Dentistry, San Francisco.....	195	195	52
Colorado :			
*University of Denver, Dental Department, Denver.....	31	28	8
District of Columbia :			
*Columbian University, Dental Department, Washington	63	56	14
*Howard University, Dental Department, Washington.....	13	12	3
*National University, Dental Department, Washington.....	47	47	6
Georgia :			
*Atlanta Dental College, Atlanta.....	202	200	40
*Department of Dentistry, Southern Medical College, Atlanta.....	52	49	5
Illinois :			
*Chicago College of Dental Surgery, Chicago	436	399	107
¶Columbian Dental College, Chicago.....	63	63	25
*Northwestern College of Dental Surgery, Chicago.....	12	10	3
*Northwestern University Dental School, Chicago, and American College of Dental Surgery, *consolidated*.....	543	543	149
Indiana :			
*Indiana Dental College, Indianapolis.....	157	157	43
Iowa :			
*Dental Department, State University of Iowa, Iowa City.....	212	212	33
Kentucky :			
*Louisville College of Dentistry, Louisville...	141	141	33
Maryland :			
*Baltimore College of Dental Surgery, Baltimore.....	207	207	44
†Baltimore Medical College, Dental Department, Baltimore.....	34	30	3
*University of Maryland, Dental Department, Baltimore.....	204	202	42
Massachusetts :			
*Boston Dental College, Boston.....	189	189	37
*Dental Department of Harvard University, Boston	104	103	22
Michigan :			
*Detroit College of Medicine, Department of Dental Surgery, Detroit.....	70	70	19
*University of Michigan, College of Dental Surgery, Ann Arbor.....	190	189	60
Minnesota :			
*University of Minnesota, College of Dental Surgery, Minneapolis	90	84	14

	Matriculants.	Attendance.	Graduates.
Missouri:			
*Dental Department, Marion Sims College of Medicine, St. Louis	44	38	6
*Kansas City Dental College, Kansas City	149	135	47
*Missouri Dental College, St Louis	101	96	29
*Western Dental College, Kansas City	220	202	46
Nebraska:			
†Dental Department, University of Omaha, Omaha	33	31	3
New York:			
*New York College of Dentistry, New York	339	309	74
‡New York Dental School, New York		16	3
*Dental Department, University of Buffalo, Buffalo	187	187	36
Ohio:			
*Cincinnati College of Dental Surgery, Cincinnati	33	33	8
*Cleveland University of Medicine and Surgery, Dental Department, Cleveland	23	23	6
*Ohio College of Dental Surgery, Cincinnati	213	210	47
†Ohio Medical University, Department of Dentistry, Columbus	62	62	13
*Western Reserve University, College of Dentistry, Cleveland	53[b]	53	7
Pennsylvania:			
*Pennsylvania College of Dental Surgery, Philadelphia	343	319	96
*Philadelphia Dental College, Philadelphia	409	400	116
*University of Pennsylvania, Department of Dentistry, Philadelphia	325[c]	310	74
Tennessee:			
*Central Tennessee College, Meharry Dental Department, Nashville	18	18	3
*Tennessee Medical College, Department of Dentistry, Knoxville	18	18	2
*University of Tennessee, Dental Department, Nashville	54	50	11
*Vanderbilt University, Department of Dentistry, Nashville	154[d]	150	29
Virginia:			
*University College of Medicine, Department of Dentistry, Richmond	36	36	13
Washington:			
‡Tacoma College of Dental Surgery, Tacoma	26	25	3
Wisconsin:			
†Milwaukee Medical College and School of Dentistry, Milwaukee	65	60	6
Total	6212	6003	1446

* Members of the National Association of Dental Faculties.
¶ Announces that it will conform to the rules of the National Association of Dental Faculties.
† Application for membership in National Association of Dental Faculties favorably reported upon.
‡ Gave notice that it will present its application for membership in the National Association of Dental Faculties in 1897.
a Including one special student.
b Including one post-graduate.
c Including seven special students.
d Including three special students.

New schools organized during the year. (No sessions held as yet.)

COLORADO:

¶Colorado School of Dental Surgery, Denver.

PENNSYLVANIA:

¶Pittsburg Dental College, Department Western University of Pennsylvania, Pittsburg.

Corporations conferring the dental degree (no other information at hand).

ILLINOIS:

German-American Dental College, Chicago.

MISSOURI:

Kansas City College of Dental Surgery, Kansas City.

WISCONSIN:

Wisconsin College of Dentistry, Milwaukee.

	TOTAL.
1. Dental colleges in active operation	46
2. Organized during the past year	2
3. Corporations conferring the dental degree	3
	51

According to these statistics there were matriculated as students of dentistry during the past year 6212 persons; 6003 of whom were in actual attendance, and upon 1446 of whom the dental degree was conferred.

With respect to the foregoing the report states that "It is deserving of mention that every college now actively engaged in teaching, or which has been organized during the year, is either a member of the National Association of Dental Faculties, has an application for membership pending, or has announced its intention to conform to the rules or apply for membership in the National Association of Dental Faculties.

"In the latter class there are but five colleges in the country, and these intend to apply for membership as soon as they have complied with certain necessary requirements."

This statistical exhibit is one of great value from many standpoints. It is in the first place a trustworthy presentation of the number and character of the institutions at present engaged in dental education in America, and the magnitude of their product. It shows further the numerical strength of the National Association of Dental Faculties. The one important factor lacking is some intimation of the quality of the educational output. As an indication of the effect of the organized effort represented in the Faculties Association the report announces the adoption of a system by which a progressive elevation of the matriculate requirement for entrance upon the dental course is provided for and soon to be put into practical operation. The importance and benefit of such a step can hardly be over-estimated, as it will compel the general selection of a better grade of student material and at least in-

hibit the tendency to accept all applicants whether fitted for entrance upon dental study or not. The enforcement of a uniform standard of matriculate requirement is undoubtedly a step in the right direction, but it is only a step. The next advance in the same direction should be made with reference to the essential elements which should be included in the matriculation requirement. We have elsewhere called attention to the importance of including in the matriculation examination some test which shall determine the fitness of a student to enter upon a course of dental study. Certainly a knowledge of language, history, mathematics, geography, etc., is not of itself sufficient warrant to enter upon a dental course. The matriculate examination should include some test of an applicant's ability to do things, to execute in material what he has conceived of mentally. This may be regarded as impracticable, as ideal, but unless we possess ideals our attainments can never be more than mediocre. As tending to the production of suitable material from which to recruit the dental ranks and to improve the quality of student timber, it is easily within the province of the Faculties Association to investigate the systems of preliminary education now in vogue, and after a careful study of the subject decide upon what kind of preliminary training and study is best suited as a preparatory to entrance upon the study of dentistry. A well-digested summary of the best lines of preparatory study would be an acceptable addition to dental college announcements, and would undoubtedly be a welcome suggestion to many parents who are contemplating the future education of their children as dental practitioners.

The work of the Faculties Association is or should be essentially educational, and should embrace a consideration of all the factors concerned in and collateral to dental education. It is to be hoped that the business details of the organization at its coming meeting may absorb but a minor part of the allotted time, and that the vastly more important feature of its educational work may be developed to the degree that its gravity warrants.

In re Odontological Society of Pennsylvania.

We give space to the following communication at the request of Dr. Peirce. The matter was received too late for publication in the correspondence department:

May 20, 1897.

To the Editor of the Dental Cosmos:

Sir,—A pamphlet having been issued purporting to be a report of a committee made at a special meeting of the Odontological Society of

Pennsylvania held November, 1896, the publication and distribution of this said report being wholly unauthorized by the society before which it was read, the following resolution was at the annual meeting held May 8, 1897, unanimously adopted:

"*Resolved*, That the editor of the Proceedings, Dr. Joseph Head, be and is hereby authorized to publish in the DENTAL COSMOS and *International Dental Journal* (if possible) the statement that the Odontological Society of Pennsylvania authorized neither the publication or distribution of this said pamphlet which purports to be a reprint from the proceedings of the Odontological Society of Pennsylvania November, 1896."

C. N. PEIRCE.

THE PENN DENTAL JOURNAL.

THE first issue of this publication, under the auspices of the undergraduates of the Department of Dentistry of the University of Pennsylvania, is before us, and gives additional evidence that college journalism is an established factor in dental education. We have on previous occasions expressed our interest in and approval of these efforts, and the *Penn Dental Journal* is a worthy practical example of the reasons for our belief in their educational value to those who actively participate therein.

BIBLIOGRAPHICAL.

A PRACTICAL TREATISE ON MECHANICAL DENTISTRY. By JOSEPH RICHARDSON, M.D., D.D.S. Seventh Edition, Revised, Edited, and Enlarged by GEORGE W. WARREN, D.D.S. With 691 illustrations. Philadelphia: P. Blakiston & Co., 1897. 8vo, pp. 667.

The seventh edition of Richardson's Mechanical Dentistry is, to all intents and purposes, a new book, and must be considered in that light when subjected to a critical review. As a reflection of the existing condition of mechanical dentistry at the time of issuance of each of the editions, the present one is better than was any of those preceding it. It fairly, though but partially, represents contemporary practice of the science and art of prosthetic dentistry. Up to within a recent period this work was the most extensive treatise in the English language, and could therefore be judged by no other standard than its own. Within the past few months another treatise has appeared upon the same subject, and it is inevitable that comparisons will, and indeed should be drawn between them, as both are designed for the same classes of readers. Our opinion of the latter-named work is published in the DENTAL

Cosmos for November, 1896, wherein it is stated that the American Text-Book of Prosthetic Dentistry is the best text-book upon the subject in any language. Before announcing that opinion the work was read carefully from several points of view: first, as a record of facts; second, as to their arrangement; third, as to the scientific treatment of the subject; and next from a literary standpoint.

It is but just, then, that Richardson's work should be subjected to a like examination and criticism. First, then, as a record of facts. Compared with the total mass of data pertaining to the subject, the number of those recorded or considered in the work is decidedly deficient, too much space being devoted to diffuse arguments of questionable utility, and which would have been much better utilized in an exposition of facts. For example, some pages are devoted to a dissertation of elementary physics relating to the subject of vacuum chambers, and no mention is made of the proper method of determining the size and position of a vacuum chamber. Again, pages are devoted to abstracts dealing with the possible nature of the change which occurs in caoutchouc during the vulcanizing process, while the important subject of making lower partial plates is dismissed with a few lines. This relative disproportion between facts and suppositions exists throughout the book.

As to the arrangement of subjects, it lacks order; there is no logical sequence of chapters and no systematic exposition of principles. Processes devised by individuals, and which have only limited application, are given prominence, while the underlying principles of practice are ignored.

Teaching by such method, or rather lack of method, and studying after such models could be productive of nothing but mental confusion and mechanical uncertainty.

In the scientific side of the subject there are numerous errors. On p. 55 it is stated that the formula for olefiant gas and gasoline are both C_2H_4, but they differ in specific gravity. On p. 74 nitrate of potassa is referred to instead of potassium nitrate, chloride of mercury is given for mercury bichlorid, sulphuret of antimony instead of antimony sulfid.

The formula for zinc chlorid is given (p. 77) $ZnCl_4$ instead of $ZnCl_2$.

It is intimated (p. 106) that pure iridium may be swaged,—a physical impossibility; the so-called iridium of the dental depots is an alloy of platinum with a small proportion of iridium.

On p. 108 is spoken of the slight affinity of oxygen for aluminium; under certain conditions the affinity is very pronounced.

On p. 121, the contaminating and vitiating oral secretions upon plates is referred to instead of the actual fact, the effects of the products of specific fermentations. In the same connection it is given (p. 179), that the solution of enamel underlying clasps is due to the products of putrefaction; as a matter of fact the products of putrefaction are alkaline in reaction, hence are not enamel solvents.

On the same page sensitive enamel is referred to; what biologist of to-day is there who does not believe that enamel is a necessarily insensitive tissue? On the next page it is said, "The enamel is condensed." What this may mean we are unable to say.

Chloride of soda is named on page 211 instead of sodium chlorid.

On page 259, silex, silica, and silicic acid are named as one substance; this is a gross misstatement.

In the chapter on the arrangement of teeth are given positive directions which would mean disaster to the functionating of artificial teeth.

In the chapter on crown- and bridge-work are inexcusable deficiencies. Methods of crown-work are given which have but limited application, to the exclusion of more generally practiced methods. While so important and illustrative a crown as the post-and-plate crown is not described, pages are given to the method of constructing seamless collar crowns.

There can be but two methods of treating the subject of bridge-work that can prove satisfactory: the first to deal with it encyclopedically, the second to reduce the data to their underlying principle. As the former would be productive of unwieldy bulk, the latter method of exposition is necessary. The editor has followed neither method, but has described a great number of methods, selected not for their applicability, or as being representations of classes and illustrations of principles, and necessarily the presentation is too confusing to do good service as educational material.

OBITUARY.

Dr. Frank Abbott.

Died, at No. 22 West Fortieth street, New York, on Tuesday, April 20, 1897, of cardiac disease, Frank Abbott, M.D., in the sixty-first year of his age.

Dr. Abbott was born in Shapleigh, York county, Me., on September 5, 1836. He was a member of one of the oldest and best known families in New England. His ancestors came to America in 1840 and settled in Andover, Mass. He attended the schools in his native town, and at twenty years of age became a student of dentistry in the office of Dr. Ostrander,

of Oneida, N. Y., in 1855. He entered upon the practice of dentistry in Johnstown, N. Y., in 1858, where he practiced continuously until he entered the army. Through the War of the Rebellion in 1863 he served as first lieutenant in Company E, of the One Hundred and Fifteenth Regiment New York Volunteers, and after taking part in several engagements was taken prisoner at Harper's Ferry. Upon his release he went back to Johnstown. A year later Dr. Abbott removed to New York City, and took a course of medicine in the medical department of the University of the City of New York, from which institution he graduated in 1871. Immediately afterward he organized the New York College of Dentistry, and served as its dean until the time of his decease.

Dr. Abbott was an extensive writer upon matters connected with his profession, and has made many valuable contributions to its literature. He always maintained an active interest in dental society work, and as a dental educator his reputation is world-wide. He was a member of several scientific and literary societies, and was an enthusiastic collector of rare prints relating to American history, and is said to have possessed the finest collection of its kind in the country.

Dr. Abbott was a member of the University College of New York, and a prominent Mason. He leaves a widow, two daughters, and one son, Dr. Frank Abbott, Jr. His remains were buried at Johnstown, N. Y.

The following resolutions were passed at a special meeting of the students of the New York College of Dentistry held in the college on Wednesday, April 21, 1897:

WHEREAS, It has pleased Almighty God to remove suddenly from the midst of his active labors among us our beloved professor and dean, Frank Abbott, M.D.:

Resolved, That we place on record our high appreciation of his professional teachings, his manly Christian character, and his kind and genial presence;

Resolved, That we mourn his death as a personal as well as a professional loss, and that we hereby testify to our appreciation of the aid and efforts which he at all times was ready to extend to us, and to the many deeds of kindness done our members;

Resolved, That we mourn with his afflicted family, and in this, the hour of their grief, extend to them our sympathy;

Resolved, That we secure a life-size picture of him to hang in our lecture-room; that a copy of these resolutions be sent to his family, and be published in the medical and dental journals of the state.

(Signed) A. W. CURRIE,
R. H. WHITMYRE,
C. D. FOSTER,
H. M. SEAMAN,
THOS. REYNOLDS,
W. H. CUMMINGS.

DR. J. A. MARTIN.

Dr. J. A. MARTIN, who died at Strasburg, Pa., April 18, 1897, after a lingering illness, had been long a popular practitioner of dentistry at that place, up to within about three years ago, when he retired. He was in the seventy-fourth year of his age. He was a member of the Harris Dental Association, of which he was some time president. He was married in 1843 to Miss Jane D. Black, and she survives him, and also two sons and one daughter. Dr. Martin was held in high esteem.

Dr. J. Warner Knox.

Died, at Philadelphia, Pa., on April 23, 1897, James Warner Knox, D.D.S., in the seventieth year of his age.

Dr. Knox was born in the Southwark district of Philadelphia on May 1, 1827, and began his dental studies under Dr. William Calvert in 1850. He began practice in Philadelphia in 1853, and was a graduate of the Philadelphia Dental College. Beside the enviable reputation which he so long enjoyed for professional ability, Dr. Knox was actively interested in the political affairs of his ward. He was twice elected to membership upon the School Board of the Fifth Ward, and was one of the leading chess players of Philadelphia.

He was married in 1851 to Miss Elizabeth H. Cloak, who with two sons survives him.

Dr. Henry F. Blakeney.

Died, at 143 Waverly Place, New York, March 13, 1897, Henry F. Blakeney, M.D., D.D.S., in the fifty-ninth year of his age.

Dr. Blakeney was one of the first to matriculate at the New York College of Dentistry, graduating in the first class with Dr. William Carr, and receiving his diploma in December, 1869.

He also graduated from the Medical Department of the University of Pennsylvania, but practiced dentistry exclusively, laying down his life a martyr from overwork.

HINTS, QUERIES AND COMMENTS.

Ammonol.—The *American Journal of Pharmacy* for March, 1897, publishes an interesting article upon ammonol by Mr. George M. Beringer. The author reports in detail the results of a careful analytical investigation of the substance in question, and concludes "that 'ammonol,' instead of being a new 'coal-tar derivative,' is merely an admixture of the well-known acetanilid, sodium bicarbonate, and ammonium carbonate, and that the following formula represents its real composition:

℞—Acetanilid, 10 grams;
Sodium bicarbonate, 5 "
Ammonium carbonate, 5 "
Metanil-yellow, 0.005 "

He states further: "Mixtures of acetanilid and sodium bicarbonate, as an antacid and antipyretic and analgesic, have been in daily use by nearly every physician for at least a decade. The addition of ammonium carbonate as an arterial stimulant is not unusual, and in many cases such a mixture must undoubtedly prove serviceable. Mr. Joseph W. England informs me that at the Philadelphia Hospital they use an ammoniated acetanilid, the formula of which is:

Ammonium carbonate, 1 grain;
Sodium bicarbonate, 1½ "
Pulv. acetanilid, 2½ " M.
Dose, one to three powders.

"Ammonol thus appears to be another of the numerous mixtures of acetanilid that are being palmed off on the gullible physicians as new and valuable discoveries."

Foil Folding.—For far the greater number of every class of cavities I have always preferred foil folded in strip or tape form, whether the foil were of the soft or the cohesive variety. In 1852 I had a pair of foil scissors made with very long, thin-edged blades for folding gold foil, and was accustomed to use a fine soft linen napkin laid in the palm of the left hand as a pad, on which the foil strips were placed for folding. I finally employed a piece of thick rubber-dam about four by five inches in size. In this was cut near one corner a round hole of an inch and a quarter in diameter, leaving a margin of about one-half inch on each side. Through this hole the left thumb is to be pushed so that the pad will lie and be kept in the palm of the hand. I prefer pure sheet rubber about one-thirty-second of an inch thick, so that whatever the foil number or the ply of the tape, its edges will not be harshened by the pressure of the folder-edge in the soft rubber pad—a fact of much practical importance.

On this pad, for instance, a sheet of No. 4 foil may be given four folds to make a sixteen-ply tape one-quarter inch wide, or a strip of half-sheet length and one inch wide may be given five folds to make a thirty-two-ply tape one-thirty-second inch wide. Within the range of these widths of perfectly formed and pliable tapes of any desired ply, fillings of any size, shape, or situation can be rapidly built with any chosen pluggers in accordance with any preferred method of operation. The ribbons are best annealed on a mica or thin metal platen, as direct flame-contact harshens gold foil.

The rubber pad can be carefully washed and kept perfectly clean, and will serve also as a platen for the tapes, which may be readily picked up by a slight pressure of the plugger-point on the yielding pad; but a two-and-a-half-inch square of the same thick rubber makes a more convenient platen for this purpose. The tapes may be rolled into cylinders of any width or diameter, but for general packing and gold-building purposes the straight, even, pliable, directly placeable tape is the *ne plus ultra*.—W. Storer How, D.D.S., Philadelphia, Pa.

To the Editor of the Dental Cosmos:

Sir,—I see in April Cosmos that a dental practitioner had successfully used compressed nitrous oxid which had been kept in the cylinder eighteen years. I can go one better. Nineteen years ago I purchased a cylinder of gas from S. S. White, and the valve would not work. I therefore telegraphed their representative, Mr. Crosthwaite, to send me another, which I used. To-day I tried the old cylinder and succeeded in getting it open. I administered the gas to a lady patient for whom I extracted seven teeth. Everything worked satisfactorily, and I shall try it again to-morrow.—F. Bernard, April 8, 1897.

Extracting Difficult Roots.—I have found the following method of great value in extracting roots that were decayed or broken off above the margin of the gum. With a B size How twist-drill in the engine, drill into the pulp-canal as far as you can with safety; then tap with the same size How screw-tap. Then screw in a bright-metal post, following it with the chuck until it touches the root or approaches as nearly as possible. Now take hold of the chuck with your forceps and extract with as straight a pull as possible. By this method all laceration of the gums and injury to the alveolar process is avoided.—A. J. Butler, D.D.S., Cooperstown, N. Y.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING APRIL, 1897.

April 6.—No. 580,081, to J. W. Currier. Sterilizing apparatus.
" *27.*—No. 581,335, to C. M. Carr. Dental bridge-work.
" " No. 581,407, to G. N. Oldham. Sterilizer for dentists.

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ORIGINAL COMMUNICATIONS.

A LAST WORD WITH DR. ANDREWS.

BY J. LEON WILLIAMS, D.D.S., L.D.S., LONDON, ENG.

IN the April issue of the *International Dental Journal* is published a paper read by Dr. R. R. Andrews before the New York Institute of Stomatology, in which he returns to his criticisms upon my recent work in dental histology. If I were to consult my own inclinations I should certainly not reply to this paper. But I know that there are many practitioners and students in the dental profession who are much interested in the points under discussion, and who desire to be established, so far as is possible, upon the secure basis of certainty with reference to the problems of tooth-structure. Because of this there is no course open to me but to go forward and clear away the latest arrangement of obstructions.

I have two general criticisms to pass upon this last paper by Dr. Andrews before I proceed to deal with it in detail. The first is that he, in several instances, attributes interpretations to me for which not the slightest foundations can be discovered in my writings by any reasonably careful reader. This is the same charge that I had to bring against him in my reply to his former criticisms, and in the paper now under consideration he seems to devote most of the space occupied to demolishing his own self-created bugaboos.

My second charge is that he has taken explanations or interpretations of appearances which *I* have given in former articles *as opposed* to his views, and now states them as *his own* opinions founded upon *his own recent investigations* and as opposed to me. In other words, I publish in the DENTAL COSMOS for November, 1896, an article in reply to Dr. Andrews's criticisms upon former articles of mine in which I bring forward explanations or interpretations of appearances of tissues under the microscope as evidence

of his errors. In April, 1897, Dr. Andrews publishes a paper dealing with my criticisms, in which he substantially adopts *my* views as the result of his own recent original investigation and states them as though they were in opposition to my teaching. In warfare armies sometimes find their own guns which have been captured by the enemy, turned against them, but scientific discussions are not supposed to be governed by the rules which prevail in the game of warfare.

It is no doubt true, as intimated by Dr. Allan in his remarks on Dr. Andrews's paper, that a large part of the controversy of the world grows out of the misinterpretation of the disputants as to each other's meanings. For this reason scientific writers should aim at cultivating a clear style of expression and to adopt, so far as is possible, the use of such technical words and phrases as have generally recognized limits in meaning. It seems to me that much of Dr. Andrews's writing is marred by a lack of clearness and explicitness. Dr. Graf seemed to feel this in his discussion on some points of Dr. Andrews's recent paper, especially with reference to the essayist's views of the origin of the fibrous substructure of enamel.

I also instance his rather loose way of using the term "protoplasm" in describing "formed material" as well as cell contents. The term is now nearly obsolete except in popular writing, and the best recent works on cytology make little or no use of it, new and more definite terms having been constructed to designate different parts of the cell structure and cell products.

In the opening of his last paper Dr. Andrews says, in speaking of my photo-micrographs, "I can indorse every point in the development of the enamel *that they show*." (The italics are mine.) I have puzzled over this expression since I first read it, and at the moment of writing these lines I am in doubt whether Dr. Andrews means this as a concession to my skill in making the photographs, or as a kind of reassurance to those natural forces to which enamel-formation is due. But as he has paid his tribute to me in the previous sentence, I fear I must give Nature the benefit of his intended compliment, with the hope that in her subjective aspect there resides some sort of a consciousness which has a sense of humor.

Dr. Andrews has more than once intimated in a reproachful way that I indulge in ridicule, which, from his point of view, should have no place in scientific criticism. I might reply by reminding him that one of the greatest scientific lights of this century was a master in the employment of ridicule, and he seemed to find frequent occasion for its use. But, as a matter of fact, I have had no intention of ridiculing Dr. Andrews, and I think he has got his poker by the wrong end in this matter. If he will persist in making ridiculous statements, he has no more right to complain about my action when I call attention to the real value of those statements than the novice in the use of the boomerang has when the inoffensive weapon returns and whacks him on the shins instead of hitting the other fellow as he intended. Perhaps Dr. Andrews objects to anything that can be interpreted as playfulness in discussions of

this sort, but I hope this is not so. I am sure I have never thought of classing him among the owl-eyed oracles who interpret every situation in life in terms of the most ponderous seriousness. Anyhow, considering some of the situations in which Dr. Andrews has placed himself in his criticisms of my work, I hope that a humorous appreciation of a grotesque attitude is not inconsistent with the most intense earnestness. Dr. Andrews says, near the opening of his paper, that if I had been as cautious in the preparation of my first series of papers as I afterward was in answering an imperfectly printed abstract of his paper "containing type-writers' and proof-readers' blunders," there would probably be less occasion for criticism.

If this be so, then why does he prepare another paper, after having read my cautious second thoughts, in criticism of my first paper? This looks very much as though he were in sore straits for something to find fault with. As bearing upon this point he has also published a card in the Cosmos for November, 1896, in which he laments the above mentioned "type-writers' and proof-readers' blunders," and says if I had *waited* until the paper which he read at Atlanta had appeared in the *Journal of the American Medical Association* I should have been spared the use of ridicule. I have to say in reply to this that I had no reason to doubt the correctness of the report which appeared in the Cosmos. I have had considerable experience with the proof-reader of that journal, and have always found him very accurate in his work; and even now, after all that Dr. Andrews has said in explanation of these blunders, I fail to see how either type-writer or proof-reader can be blamed for the particular mistake which was most open to criticism. I refer to the one in which *he criticises his own writing* which had, by mistake, been placed in quotation points as mine. The fact is that he leads up to this by a sentence which could hardly have been inserted bodily by type-writer or proof-reader. As to his plaint that I should have waited,—well, it comes with ill grace from him, as we shall see. The last installment of my paper on "The Formation and Structure of Dental Enamel" was published in the Cosmos for June, 1896. On May 5, *or about a month before the complete publication of my paper had appeared*, Dr. Andrews rushes off to deliver an address in criticism of the first installment. This address was reported in the June issue of the Cosmos, and my reply was not written until the last days of September, and was published in the November number of the Cosmos five months after his publication. The facts as to haste or caution in criticism speak for themselves.

The various points which I wish to criticise in Dr. Andrews's last paper I will now examine in the order in which they stand as published, and I shall assume under the circumstances that the paper as it appears in the *International* is free from type-writer's and proof-reader's blunders.

Dr. Andrews says with reference to the preparation of tissues for microscopical study, that "In studying these finer processes with the use of the higher powers of the microscope it is seldom

necessary to stain the sections. They show their structure beautifully without stain. It will be a revelation to those working by the older methods to study tissue prepared in this simple way. One would like to know more about these "simple ways," as, for instance, whether the tissues are to be "fixed" or "hardened;" whether sections are to be cut by freezing or imbedding; how they are mounted for examination, etc. But in the absence of all detailed information on these points I can only ask what should we know to-day about cell anatomy or, more especially, cell physiology, if the processes of selective staining for tissues had never been discovered? I fear our knowledge would be even more "simple" and elementary than the method referred to.

In this connection Dr. Andrews forces an unpleasant task upon me, namely, that of making comparisons between his technique, as shown in his photographs, and the results of my own method of working. He compliments my photographs that he may have the opportunity of saying that my work is chiefly notable on this account. Probably no one knows better than he does that if my work has any merit, it depends primarily upon the methods that have been adopted for the preparation of the tissues and sections. As I have before pointed out, there are two simple methods for determining whether sections of developing teeth have been carefully and skilfully prepared. If there is an absence of shrinkage, especially at the point where the hard and soft tissues meet, and if the blood-corpuscles are not shrunken or distorted, we may safely assume that the best possible methods of preparation have been followed. I ask those who are interested in these matters to compare photographs accompanying this criticism with those which illustrate Dr. Andrews's last paper in the *International*, or with any others that he has published, and decide which shows the strongest evidence of careful preparation of tissue. I do not believe there is a single histologist of recognized repute who would indorse Dr. Andrews's method of cutting and mounting tissues without "fixing," especially if designed for cytological work. The real difficulty with Dr. Andrews seems to be, that notwithstanding his avowed indorsement of my photographs he is unwilling to admit anything that is not shown in his own photographs.

The next point which Dr. Andrews takes up is that of the blood supply to the enamel-organ, and I find it a very severe strain upon my credulity and charitable inclinations not to believe that he is indulging in conscious misrepresentation in what he has to say about my position on this subject. Of course I prefer to think, as I did concerning his first criticism, that this is an instance of the most careless reading which has ever come to my notice.

Dr. Andrews charges me, in substance, with claiming that I have seen blood-vessels developing in the stellate reticulum. If he does not mean this, then his language conveys no meaning of any sort. He says that Wedl, Magitot, Legros, and Sudduth have all failed to detect blood-vessels in *the enamel-organ proper*, and he questions "how a plexus of blood-vessels—a connective-tissue structure—can be developed in this epithelial mass." On the following page he

gives the names of several observers who he says have seen blood-vessels in the *stratum intermedium*. Therefore, by *enamel-organ proper* he *must* mean the stellate reticulum. Now let us see what I have said upon this point, not only in that later article which he characterizes as "cautious," but in my first paper. I take up this subject in detail in the second installment of my paper in the issue of the Cosmos for April, 1896. On page 285 I give an illustration with description showing the developing blood-vessels in the connective tissue just outside the stellate reticulum. On the succeeding pages I show the development of papilliform structures about capillary loops from the outer epithelial tunic and the approach of these structures to the *stratum intermedium* by the gradual disappearance of the stellate reticulum, and I say, "as the stellate reticulum disappears this papillary layer approaches and finally melts into and coalesces with the stratum intermedium." These observations, it may be seen, are in perfect agreement with the remarks made on this point by Professor Wortman during the discussion of Dr. Andrews's paper.

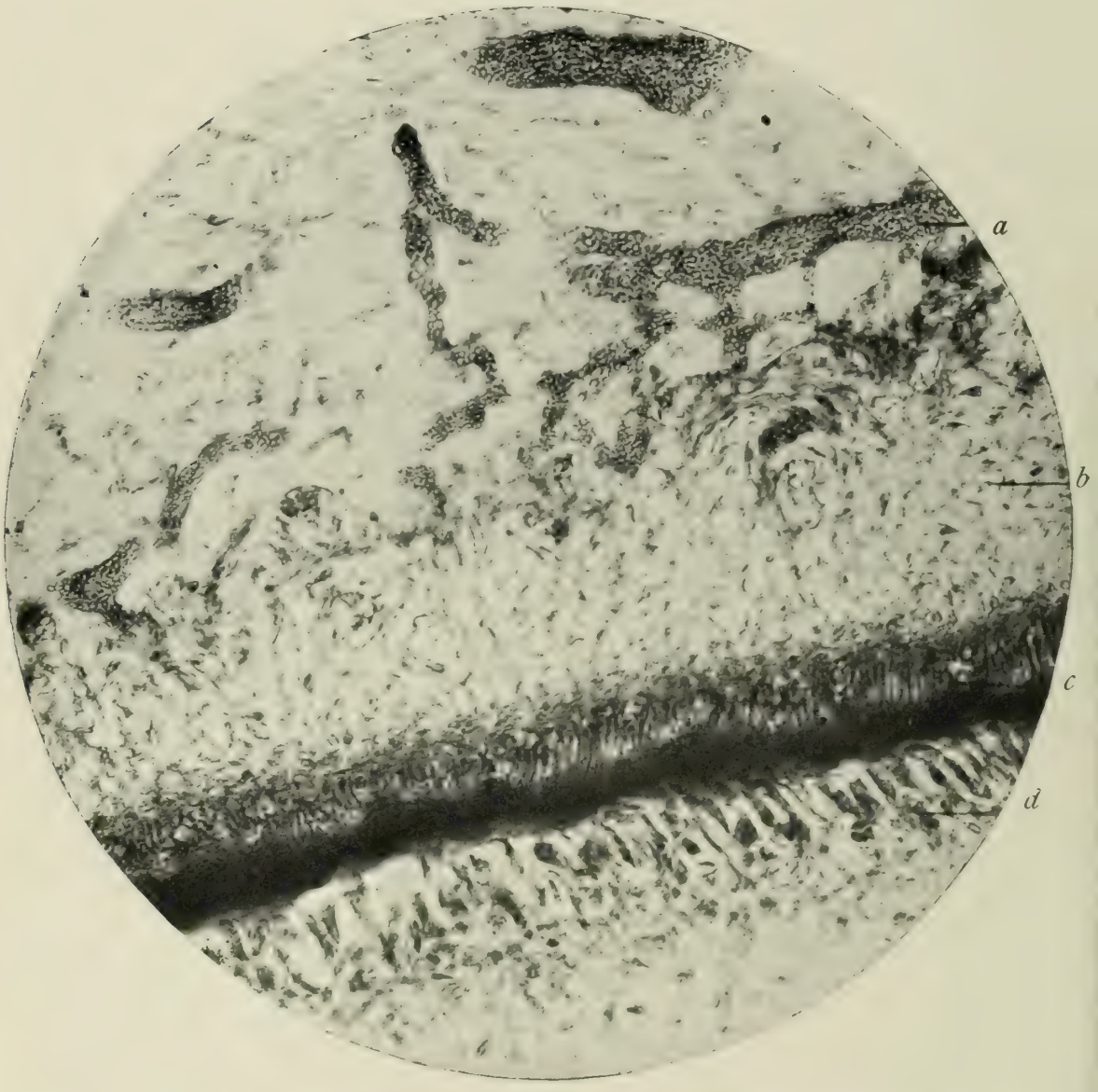
On page 291 of this same issue of the Cosmos I say, "With reference to the long-disputed point of the existence of blood-vessels in the stellate reticulum, I have to say that in the examination of many thousands of sections from embryos of all ages, taken from many different animals, *I have never yet seen a blood-vessel in this tissue.*" Could I have expressed myself in more explicit and straightforward language than I used here? And yet, in the face of my carefully marked and explained photograph, Dr. Andrews goes to New York, gathers his friends about him, and they spend an evening in discussing my errors of interpretation, prominent among which is my alleged teaching that blood-vessels are to be seen developing in the stellate reticulum. What sort of spectacles, I am constrained to ask, did the learned gentlemen who discussed me before the New York Institute of Stomatology wear that they should get such crooked views of matters? Or did they take their brief ready made from the attorney for the prosecution?

I am certain that no one who is familiar with this subject could carefully read what I have said on pages 287 to 292, inclusive, of the April number of the Cosmos for 1896, and make such assertions in good faith as these to which I have referred. There seems to me strong evidence that Dr. Andrews saw the difficulty of his position on this point, for he attempts to *force* this misinterpretation upon me by giving a purely arbitrary, and I may say wholly untrue, definition of my expression "the enamel-organ proper." He says "the term 'the enamel-organ proper' describes it when the organ is in its perfected state, *before calcification commences*" (the italics are mine). In other words *the organ is in its perfected state before it begins to be functional!* Could a more absurd definition be imagined? Of course any reasonable definition of the term "the enamel-organ proper" must recognize the tissues that are actively concerned in the formation of enamel. But according to Dr. Andrews there is no *enamel-organ proper* after the calcification of enamel begins, and presumably, the formation of this tissue pro-

ceeds quite independently of a proper formative organ. This ridiculous position was his only chance of making a point against me, and he took it in the face of the explicit and unmistakable statements to which I have already referred.

I pass over several points which are really too trivial for even a passing notice, and come to Dr. Andrews's statement that he has

FIG. 1.



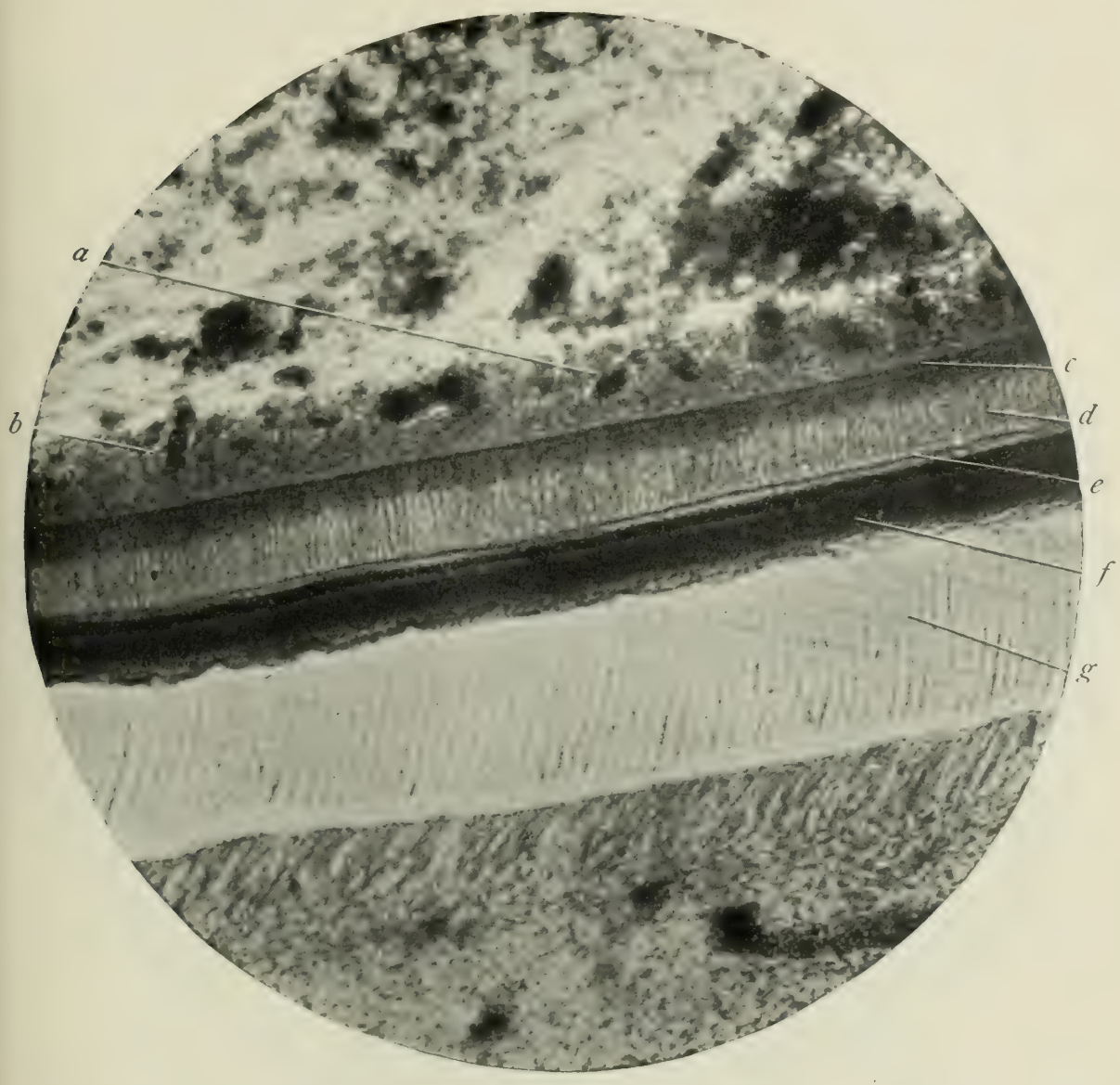
SECTION OF DEVELOPING TOOTH AT THE TIME OF THE COMMENCEMENT OF ENAMEL-FORMATION. × 200.

The so-called "stellate recticulum" shown at *b* has nearly disappeared, and the developing blood-vessels, seen at *a*, are approaching the *stratum intermedium* and ameloblasts shown at *c*. (Compare Figs. 48 and 50 in my series of papers on The Formation and Structure of Enamel.)

"recently investigated" the structures to which I gave the provisional name of "ameloblastic membrane." And what is the result of his recent investigation? He finds that "it has the appearance of being a collection of fibers, and within the meshes of these fibers we find an accumulation of protoplasm, condensed perhaps by a post-mortem change, and this gives the appearance of a layer." A little farther on he says again that this condensed protoplasm in the meshes of the fibrous structure causes "the appearance of a

discreet substance which shows a definite chemical reaction to the presence of certain stains." Let the reader now turn to page 897 in the COSMOS for November, 1896, containing my first reply to Dr. Andrews, and he may there see the following as my further explanation of these structures: "It is quite possible that the structures which I have called the inner and outer ameloblastic membrane are formed by the accumulation of the calcific albuminous

FIG. 2.



SECTION OF DEVELOPING TOOTH AS SEEN AT A STAGE A LITTLE LATER THAN IS SHOWN IN FIG. 1. × 200.

The "stellate reticulum" has entirely disappeared, and the blood-vessels are everywhere to be seen in the *stratum intermedium*, as at *a* and *b*.

c, Outer ameloblastic membrane; *d*, Ameloblasts; *e*, Inner ameloblastic membrane; *f*, Enamel; *g*, Dentin.

product of the *stratum intermedium* in the meshes of these plasm-strings which spread out on both ends of the ameloblasts, forming a structure resembling a membrane. This view would explain the identical reaction of these structures to any given stain." As this was published some two months before Dr. Andrews read his paper in New York, it will be seen that the results of his "recent investigations" were predestined to receive my cordial indorse-

ment. The fibrous nature of both of these structures is very clearly shown at *c* and *e*, Figs. 2 and 3, and at *b* and *d*, in Figs. 4 and 5. A mere glance at these illustrations will also show that Dr. Andrews's explanation of the inner ameloblastic membrane has not the least applicability to this structure as shown in my photographs. The tissues are so torn and displaced in the illustrations which accompany his paper that I would not accept any explanation deduced from them.

FIG. 3.



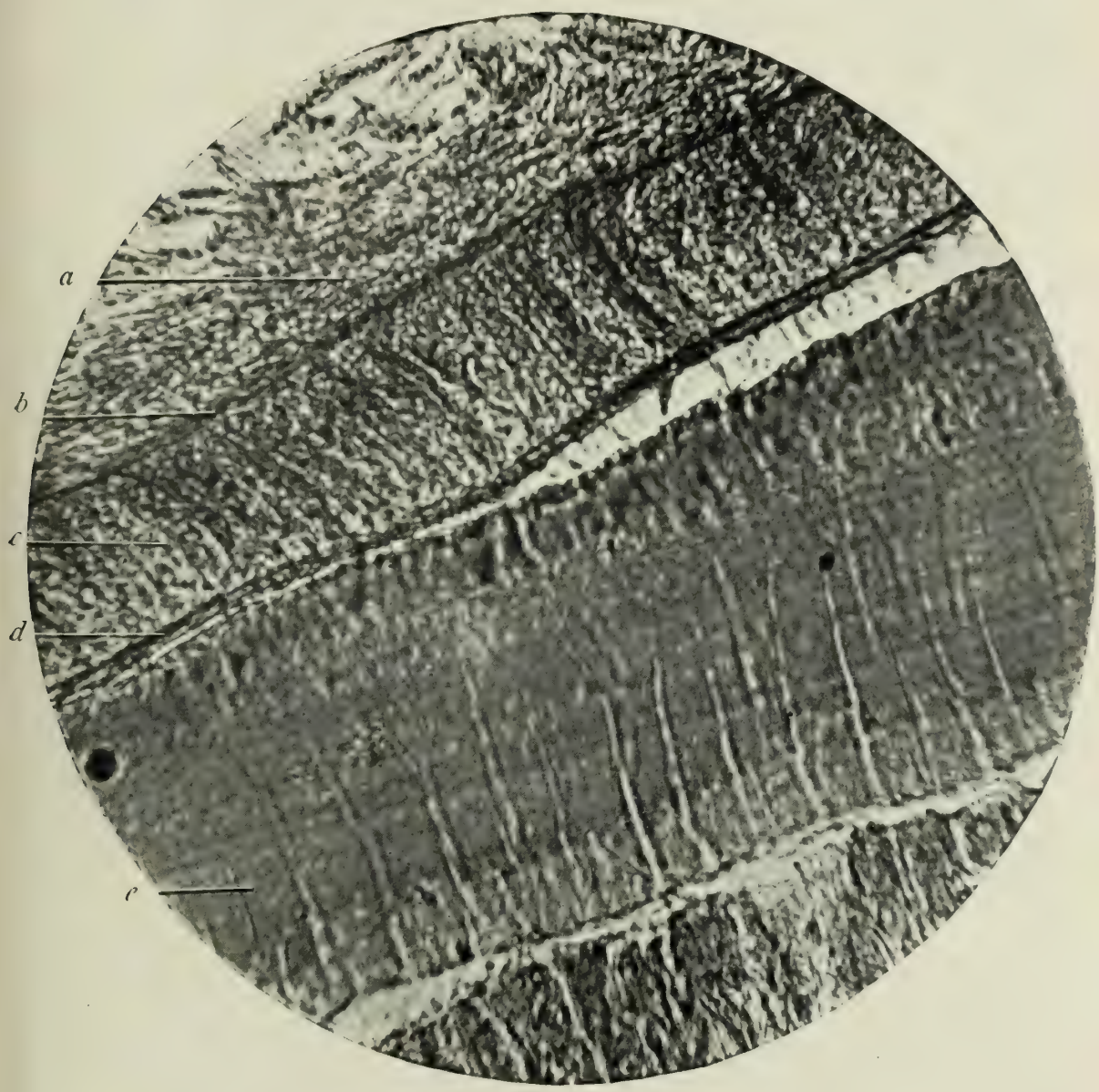
SECTION OF DEVELOPING HUMAN TOOTH. × 1000.

a, Cells of "stellate reticulum;" *b*, ***Stratum intermedium***; *c*, Outer ameloblastic membrane; *d*, Ameloblasts showing cytoplasmic fibers or threads; *e*, Showing fibrous character of inner ameloblastic membrane.

The essential truth and not hair-splitting terms is what I am after, and the truth is, as may be seen in almost all of my photographs showing developing enamel, that the ameloblasts are bounded at both ends by a membrane-like structure of a fibrous nature which reacts on selective stains in precisely the same manner. Dr. Andrews says this membrane-like appearance is not always to be seen. According to my experience it *is* always shown

when the sections are cut exactly perpendicularly to the long axes of the ameloblasts. Obliquely cut sections, while not showing the sharply-defined line, often exhibit the fibrous nature of the structure. Dr. Andrews has a method of disposing of appearances which stand in the way of his own interpretations by saying they are due to post-mortem changes. But charges of this sort must rest upon evidence. I stated at the very outset of my first series

FIG. 4.



SECTION OF DEVELOPING TOOTH OF LAMB. × 1000.

a, *Stratum intermedium*; *b*, Outer ameloblastic membrane; *c*, Ameloblasts; *d*, Showing fibrous character of inner ameloblastic membrane; *e*, Dentin.

of papers that I had used a great variety of methods which have been approved by the most expert histologists of the present time. For the study of cytology tissues have been fixed by placing them while still warm, or instantly after death, in Flemming's and Hermann's solutions, saturated solution of corrosive sublimate, and absolute alcohol. Other well-known methods have been used for general work. Sections have been mounted in a variety of mediums after having been stained by various approved methods.

When one discovers certain structural appearances persisting through all these different methods of treatment, it is simply folly

FIG. 5.



SECTION OF DEVELOPING TOOTH OF PUPPY. × 450.

a, ***Stratum intermedium***; *b*, Outer ameloblastic membrane; *c*, Ameloblasts; *d*, Inner ameloblastic membrane; *e*, Forming enamel-rods; *f*, Dentin; *g*, Recently formed layer of dentin; *h*, Odontoblasts.

Observe the complete absence of shrinkage in the tissues. The odontoblasts and the ameloblasts lie close to the forming lines of dentin and enamel.

to talk about their being due to post-mortem changes. The pedagogical assumptions which everywhere come to the surface in Dr.

Andrews's criticisms may be all right before a class of students, but they seem a trifle out of place in discussions of this sort.

All that I have pointed out in the nature of evidence as to the function of the cells of the *stratum intermedium* is now conceded by Dr. Andrews, so I need say no more on that point.

He next takes up the subject of nuclear segmentation, and says "there are no reasonable grounds for the hypothesis that the phenomena of nuclear segmentation have anything to do with the forming of the lifeless, calcific substance which is to form the rods of the enamel." Whose hypothesis is he referring to here? Certainly not mine, for I have never remotely suggested such an hypothesis. I have said that the calcific material is deposited in an organic substructure, and that this organic substructure, the pattern of which differs considerably in different specimens, and often in the cells or enamel-rods of any given specimen, may be formed by or from the nucleus. In other words, the cytoplasm of the cell, of whatever structure, may spring from the nucleus. I have pointed out that more frequently than otherwise this cytoplasm of the ameloblast is arranged in sections after having a spherical or globular shape, and that in certain specimens a single cell is seen to be composed of five or six of these sections. Sometimes there are no sections to be observed in the cytoplasm of the cell, but only plasmic strings running down the cell in parallel directions. I have further called attention to the fact that the difference in the structure of enamel-rods corresponds with these differences observed in the ameloblasts. I have also shown that the cytoplasm of the ameloblasts may in fortunately prepared sections, sometimes be seen to pass into the forming enamel without break in continuity. This is particularly well shown at *f*, in Fig. 6. The photographs which I exhibit show very strong evidence that in both enamel and dentin formation the inner end of the cytoplasm of the cell or that part next to the line of forming tissue is infiltrated with an albumin-like, calcific-bearing substance. In enamel formation, when the cytoplasm in the lower end of the cell has become completely charged with the albumin-like, calcific-bearing substance, it seems to be shed off upon the line of forming enamel. But there appears to be no break in the continuity of the cytoplasm. The cytoplasmic strings, or sections connected by strings, which are being calcified in the forming enamel-rod, appear to be continuous with those seen in the ameloblasts.

All of the appearances which I have described as shown in the fully-formed enamel-rod have a direct bearing upon some of the most recent problems in cytology and biology. All who keep in touch with the latest investigations in these fields are aware that there are two theories concerning the structure of protoplasm, the one or the other of which is accepted by most of the leading histologists. One is the foam or alveolar structure theory of Bütschli, and the other that advocated by Frommann, Arnold, Fleming, and by probably much the greater number of contemporary investigators. This view teaches that the more solid portions of the cell-structure consist of coherent threads, strings, or fibers which every-

where pervade the ground substance, either separately or united by offshoots, and generally combining to form a meshwork, reticulum, or spongiose structure. The threads of the meshwork or reticulum have often been observed to be granular, and this appearance has led to another theory, which has been especially developed

FIG. 6.



FROM SECTION OF DEVELOPING TOOTH OF CALF AT THE COMMENCEMENT OF ENAMEL-FORMATION. × 1000.

It is clearly seen from this photograph that the organic substructure of both enamel and dentin is formed from the cytoplasm of the cells.

a, Cytoplasmic net-work in ameloblast; *b*, *c*, *d*, *e*, Globular or spherical pattern of cytoplasm. Radiating lines are seen to pass from a central mass to a rim which bounds the circumference thus resembling nuclear structure. A like appearance is shown in the completely formed enamel-rods in Fig 73, in my papers on the formation of enamel. Compare also Figs. 40 and 58 of the same series. *f*, Shows cytoplasm of ameloblast passing without break of continuity into the forming enamel.

by Altmann, teaching that these granules (now generally termed microsomes) are actually bioblasts or organic units capable of assimilation, growth, and division, and constituting the elements out of which the fibers or threads are formed. The suspicion that these various features may, to a considerable extent, be due to the

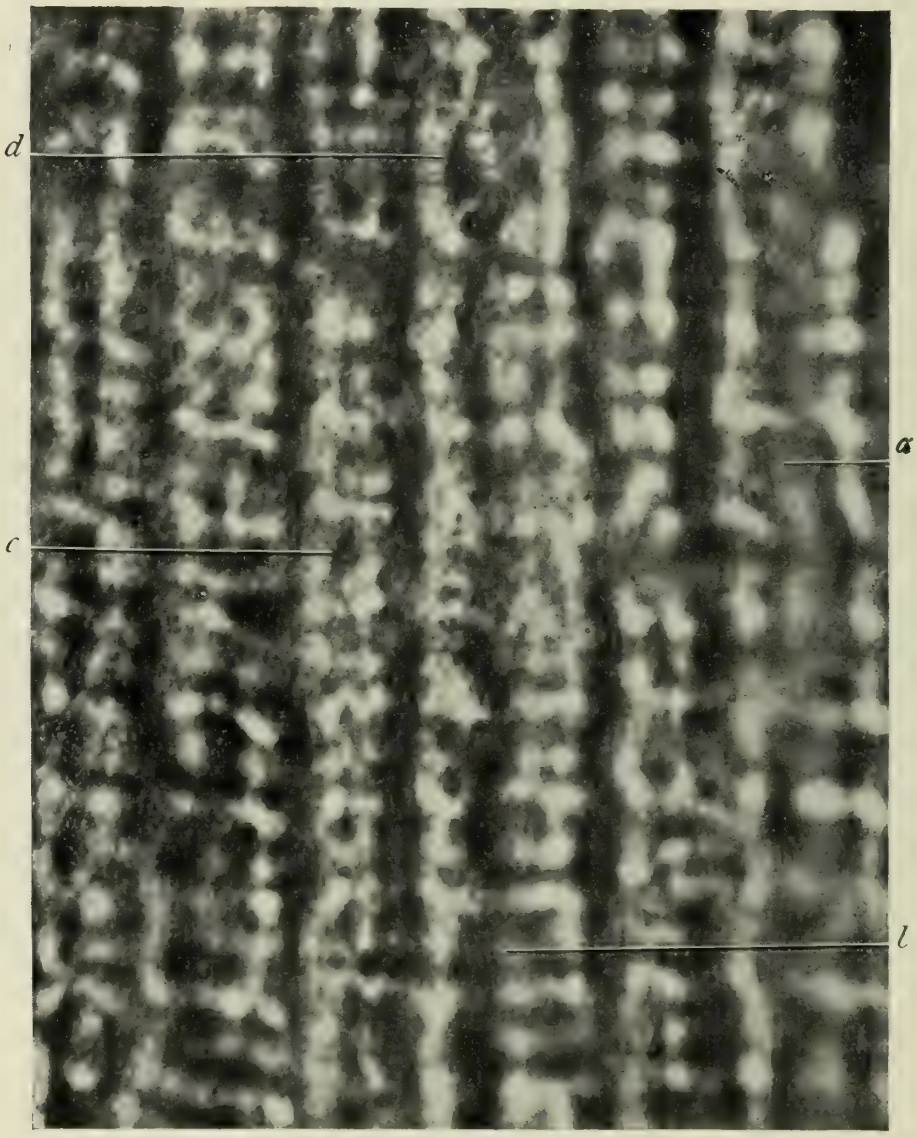
action of the reagents used in the treatment of the tissues has stood in the way of a complete acceptance of the views mentioned.

Professor Wilson, in treating of the structural basis of the cell, says of these granular fibers, "The difficulty is to determine whether this appearance represents the normal structure or is produced by a coagulation and partial disorganization of the threads through the action of the reagents. . . . It is very difficult to determine this point in the case of the cyto-microsomes, owing to their extreme minuteness. The question must, therefore, be approached indirectly by way of an examination of the nucleus and its relation to the cytoplasm. Here we find ourselves on more certain ground, and are able to make an analysis that in a certain measure justifies the hypothesis that the cyto-microsomes may be true morphological elements having the power of growth and division like the cell-organ formed by their aggregation." It will be seen from this quotation that Professor Wilson is strongly inclined to regard the granular appearance of the cytoplasmic threads as a true structural feature. Van Beneden, in speaking of the same subject, expresses himself in a much more positive manner. He says, "In my opinion every fibrilla, though it appears under the microscope as a simple line devoid of varicosities, is formed at the expense of a moniliform fibril composed of microsomes." I believe my studies of the structure of the enamel-rod enable me to throw a little light on these difficult problems. We have seen in the calcified organic matrix composing the basis of the enamel-rod every structural feature to be observed in the cytoplasm of the ameloblast, and we may conclude, as I have previously remarked, that this calcified matrix faithfully represents the cytoplasmic structure of the cell. There is here no question about effects produced by chemical reagents. The calcification of the cement-substance of the enamel has most perfectly preserved the minutest structural features of the cytoplasm. With the finest lenses and an amplification of from 2500 to 3000 diameters we are able, in nearly every instance, to resolve the fibers composing the calcified organic matrix of the enamel-rods into a continuous thread of granules. (See Fig. 7.) And we further observe that although these granular threads form a fairly constant feature in the structure of the enamel-rod, yet there is, aside from these, a very great variety in the structural appearances of the organic matrix even within the limits of normality. As the line of forming enamel increases in thickness, and the ameloblasts move outwardly, new cytoplasm must be formed from some source, and as I have often observed these sections, or spherical or globular arrangements of cytoplasm lying immediately below the nucleus, I suggested that they might be formed from the nucleus. But I have never hinted that the albumin-like calcific-bearing substance was formed in or by the nucleus. But upon this point I may say here that I agree perfectly with Dr. Graf that "secretion and excretion are metabolic processes, and must be directly influenced by the nuclear substances."

My belief that the sectional masses of cytoplasm seen in the ameloblasts *might possibly* have their origin from the nucleus was

not entirely founded upon my own observations, but was partly based upon the conclusions of the best recent authorities in this field of study, and I further suggested that they might be of the same nature as the *nebenkern*. Dr. Andrews informs us that the *nebenkern* or paranucleus is a body "formed from the remnants of spindle fibers after the last act of cell division preceding the forma-

FIG. 7.



FROM SECTION OF MATURE HUMAN ENAMEL OF FINE QUALITY. × 3000.

a, *b*, Calcified cytoplasmic net-work composed of very fine granular threads or fibers; *c*, *d*, Enamel-rod built up of sectional or globular arrangement of calcified cytoplasm. Radiating granular threads pass from a central mass to the border of the sectional part of the rod.

Compare with *c* and *e*, Fig. 6, and *b*, *d*, Fig. 8, of this paper.

tion of spermatozoon." Unfortunately for Dr. Andrews, his reading and "recent investigations" have not been extended quite far enough upon this point for him to set up as an authority.

Professor Edmund B. Wilson, in the useful glossary appended to his recent and very fine work on "The Cell in Development and Inheritance," in defining the *nebenkern* gives substantially the explanation quoted by Dr. Andrews, and then adds, *"Since applied*

to many forms of cytoplasmic bodies of the most diverse nature." This completely covers the ground of my suggestion.

With reference to the hint that the structure in question might be formed from the nucleus, I may add to what I have already said that it was merely intended as indicating a possible origin. But since Dr. Andrews attacks the idea as one entirely beyond the bounds of probability, and quotes "a biologist of world-wide reputation" (how useful these *authorities of world-wide reputations* are) who says, "In general I doubt the origin of many things which have been supposed to be budded off from the nucleus," it may be as well for me to show the value of his opinion as well as that of the gentleman whose reputation is so very extensive. Professor Wilson's work on the cell, to which I have referred, has everywhere been received as the most valuable work produced on this subject up to date. In treating on the "Growth and differentiation of the germ-cells" he says, "There is now a great body of evidence that seems to show with equal clearness that a part of the egg-cytoplasm is directly or indirectly derived from the nucleus." Shortly after this statement he adds the following: "A large number of observers have maintained that a similar giving off of solid nuclear substance occurs during the earlier stages of growth, and these observations are so numerous and some of them are so careful that it is impossible to doubt that this process really takes place. The portions thus cast out of the nucleus have been described by some authors as actual buds from the nucleus (Blochmann, Scharff, Balbiani, etc.), as separate chromatin rods (Van Bambeke, Erlanger), as portions of the chromatin net-work (Calkins), or as nucleoli (Balbiani, Will, Leydig)."

The pronouncement that I have mistaken the phenomena of karyokinesis or nuclear segmentation for such appearances as I have described in the cytoplasm of the cell, is too ridiculous for serious consideration.

With regard to the origin of the organic matrix of enamel I maintain that Dr. Andrews has not given us a single fact, either in his photographs or in his text, for the assumption that the organic substructure of enamel is formed from fibers which have an extra cellular origin; and I can hardly imagine a proposition more foreign to all that we know of the methods of tissue formation than that put forward in the theory that fibers are formed outside of the cells, and that these fibers penetrate the nucleus and cytoplasm of the ameloblasts and pass on into the forming enamel.

On the other hand, there are many facts which directly or indirectly go to show that this substructure is originally formed in the cell, and is, in short, one with the cell cytoplasm. Some of this evidence I have given in former papers, the most important of which is the close resemblances observed between the structure of the completely formed enamel-rod and the cytoplasm of the ameloblast. Dr. Andrews's only answer to this mass of evidence is the opinion that the structure which I have pointed out in the enamel-rods is due to imperfect calcification, and that nothing of the kind is to be seen in perfectly calcified tissue. He could not more com-

pletely have given himself away than in this statement. My observations and photographs show that the finer the enamel the finer and more regular is the granular net-work or substructure of the enamel-rod. It is perfectly true that the pattern of the cytoplasmic net-work composed of granular fibers is much more clearly shown in imperfectly calcified enamel or in enamel in which the cement-substance has been removed by acid from the process of decay or by artificial treatment.* In my recent articles on the pathology of enamel I have pointed out that the appearances of imperfectly calcified enamel and decaying enamel are often indistinguishable. This is precisely what we should expect if the tissue is formed in accordance with the views I have set forth. The absence of the cement-substance *from any cause* leaves the cytoplasmic substructure more clearly revealed. But all of these appearances, which I have shown are thus harmoniously explained, are quite unintelligible when approached from the standpoint of Dr. Andrews's theories.

As bearing upon the origin of the granular fibers or net-work observed in the enamel-rods, I reproduce (Fig. 11) an illustration from Professor Wilson's book showing various forms of ciliated epithelium in which the cilia are seen to be continuous with the cytoplasm of the cell and, at least in one instance, to be connected with and possibly to have their origin in the nucleus.

Dr. Andrews next takes up for consideration the nature of the globular bodies and the inter-rod cement-substance. He says that enamel is composed of "two distinct products, both of the same nature." But he has forgotten his "epithelial fibers." Counting these he has *three* distinct products. Again I say he has not given us a single fact on which to base his assumptions. At present there is nothing to show that enamel is composed of more than two distinct products of the enamel-forming cells,—an organic substructure which becomes infiltrated with an albumin-like calcific-bearing substance. All of the appearances of forming enamel and of various stages of decalcified mature enamel tend to show that the substance between the enamel-rods is identical with that filling the organic substructure of the rod. The evidence of this position as shown in Figs. 37, 46, 66, 67, and 68 in the Cosmos for April, 1897, appears to me to be almost beyond the possibility of refutation.

The next point in my papers which Dr. Andrews seizes upon for castigation has evidently given him great delight. He quotes my statement that the experiments of Rainey, Harting, and Ord have not settled the problem of dentin and enamel formation, and that they are to be accepted for just what they are worth and no more, and his first comment upon this statement is: "This assertion is contrary to all the authorities of which I know." The plain and palpable meaning of this is that all of the authorities with which Dr. Andrews is familiar assert that the experiments referred to *are to be*

*In his remarks on Dr. Andrews's paper, Dr. George Allan said he had failed to see the cytoplasmic net-work in the enamel-rods. It shows plainly enough in many of my photographs, and I hope it will be clearly seen in the illustrations which accompany this paper.

taken for more than they are worth, and that they do completely explain the formation of dentin and enamel in the living organism. No doubt this all appeared very serious to Dr. Andrews when he was writing his criticism, but it seems only funny or absurd to those who read intelligently and consistently. And here again his blessed authorities prove his undoing. He quotes Professor Sudduth as follows: "Mr. Rainey has by many and thoroughly scientific tests proved the *analogy* between his artificial calculi and those formed in the body." Not a word here, it will be seen, about a complete explanation of dentin and enamel formation, but only an *analogy*, which is precisely what I meant when I said that the experiments were to be accepted "for just what they are worth and no more." Professor Sudduth continues, "The *difference*" (the italicising is mine) "between crystallization outside of the body and crystallization within it is due to the action of the specially endowed cells." This is my position precisely. There is a difference, and this difference is due "to the specially endowed cells," and Dr. Andrews's position is sufficiently answered in the guarded statements of his own favorite authorities. It is also noticeable that the gentlemen who conducted the experiments referred to on the effect of certain viscous or gummy solutions upon certain crystalline matters are much more modest in their claims than Dr. Andrews's interpretation would imply. Professor Ord, for instance, speaking of these experiments in the preface to his work on "The Influence of Colloids upon Crystalline Form and Cohesion," says, "The story which they tell is rather suggestive than instructive; . . . The record *has not been made to prove things outside itself*" (the italics are mine), "but to serve in future endeavors toward the comprehension of the physical processes associated with life." From this statement it will be seen how far Dr. Andrews was justified in his criticism. His further gleeful comment upon my use of the term "calcoglobulin" brings out some curious assumptions on his part, and other interesting mental attitudes. It is quite true that I used this term to indicate the albumin-like calcific-bearing material while within the cells of the enamel-organ. I was quite justified in doing this for two reasons. First, because as I did not consider the substance *demonstrated* to be calcoglobulin *at any stage* of its existence, I nevertheless desired to keep it clearly in view that I was speaking of the identical matter that Dr. Andrews had often referred to in precisely the same manner; and, secondly, I could not assume, as he seems able to do, the *psychological instant* when the mixture of the albumin-like substance with calcific material becomes calcoglobulin, if calcoglobulin at any stage of enamel development is really formed. If my critic has any knowledge which will warrant his opinion that the chemical changes between the albumin-like substance and the calcific material which result in calcoglobulin *do not begin* in the enamel-cells, then he may have some small foundation for his hair-splitting methods. But the significant fact on this point is that Dr. Andrews persistently calls the albumin-like calcific-bearing material to be seen in the enamel-cells "calcospherites." The term, I believe, was first used by Pro-

fessor Harting to indicate the carbonate of lime spheres which he was able to produce in an albuminous solution. It refers only to the structural forms which result from the chemical union, and as this union is not completely effected in the enamel-cells, therefore, from Dr. Andrews's point of view, the term is altogether inappropriate and misleading. But if calcospherites really were formed in the enamel-cells, then calcoglobulin would of necessity be pres-

Fig. 8.



Ameloblasts and Forming Enamel from Developing Tooth of Puppy. × 2500.

a, *b*, *c*, *d*, Globular or sectional masses of cytoplasm seen in the ameloblasts somewhat resembling the nucleus in structure. Each one is seen to be composed of a central mass from which radiating lines, like the spokes of a wheel, pass to an outer rim. These masses may often be observed throughout the entire length of the cell, and a casual glance shows that they have nothing in common with the phenomena of nuclear segmentation.

ent, and therefore, from Dr. Andrews's own point of view, I was completely justified in using the term as I did. But let us come to the real *crux* of the matter, which is the question as to whether calcoglobulin be present at any stage of enamel formation. I have said that the albumin-like calcific-bearing material, which I sometimes designated as calcoglobulin in deference to the usage of Dr. Andrews, which becomes calcified in the forming enamel, is more quickly dissolved from its position *between* the enamel-

rods than when it has united with the cytoplasmic substance of the enamel-cells to form the globular bodies of the rods. This is perfectly true, *but* the action of acids on enamel is a perfectly graduated one from the commencement of its solution between the enamel-rods to the disappearance of the last traces of the center of the globules of which the rods are composed. This is one of the facts upon which I base my opinion that there is but one formative substance, aside from the organic substructure, entering into the composition of enamel. It was also the observed appearances of decalcifying enamel at all stages of its formation which first aroused doubts in my mind about the presence of calcoglobulin in this tissue. But the views to which Dr. Andrews takes exception do not rest, as he seems to think, upon my "unsubstantiated assertion." If he will procure a copy of *Ash's Quarterly* for June, 1896, he will find an article by Mr. Goadby, of Guy's Hospital, London, in which are recorded some interesting experiments on this subject from which I quote a few lines bearing upon the point under discussion. In speaking of certain appearances observed in the *débris* of decaying teeth Mr. Goadby says, "These have been stated by various observers to be calcospherites formed from the 'albumin' of the tooth, and composed of calcoglobulin; but in the presence of acids any globulin present would be converted into acid-albumin. Again, the conditions laid down by Rainey, Harting, Ord, and others, for the formation of calcoglobulin, are that an insoluble salt of calcium is precipitated in the presence of albumin, but albumin cannot be demonstrated in any quantity in a dead tooth, if at all, and yet the production of these bodies will go on equally well if the tooth be living or dead.

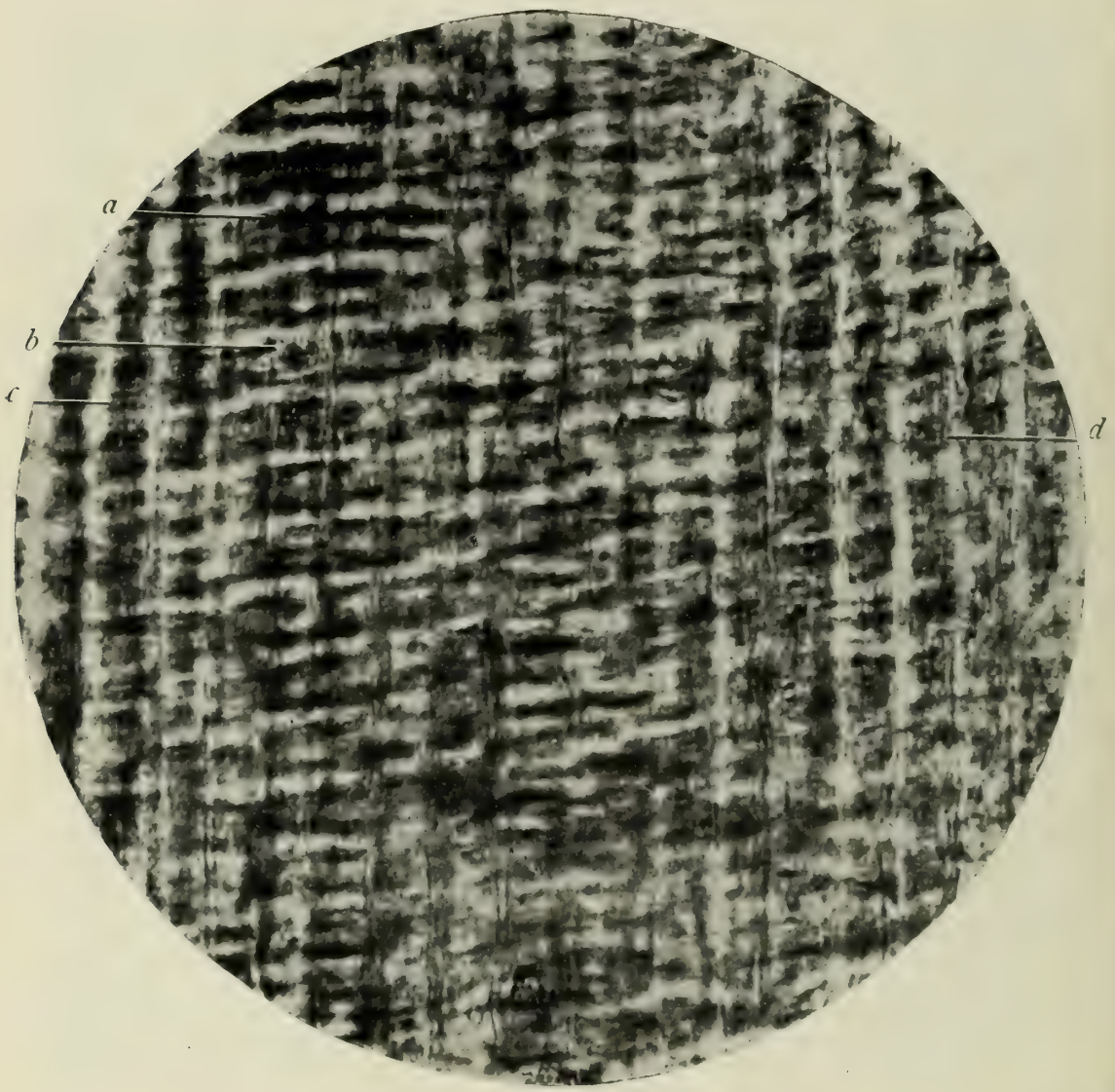
"Still further, some have described these 'calcospherites' as being particles of the matrix softened off by the acids. If so, a large proportion of the matrix must be albumin, but albumin does not give gelatin on boiling, whereas the tooth matrix does. Altogether, the general result of my experiments is to preclude calcoglobulin from the tooth matrix."

Further experiments are no doubt needed, as Mr. Goadby himself suggests, before his views can be considered as established on conclusive proof, but the above is quite sufficient to show Dr. Andrews and his critical friends that I was not altogether "shooting in the dark" in my statements.

I desire to call attention, before concluding, to what appear to me to be very palpable misinterpretations on Dr. Andrews's part of some of his own photographs. He has all along claimed that the method of enamel development begins by the formation of what he calls "calcospherites" in the ameloblasts. In the region of the nucleus, he says, the matter of which these "calcospherites" is composed is in such an extremely minute state of sub-division that "it is not often visible, even with our highest powers." These minute masses coalesce to form minute globules, and the minute globules coalesce to form larger ones as they proceed along the ameloblast inwardly until, when we reach the inner end of the cell, we have a globule completely filling it. Thus according to *the*

theory of Dr. Andrews we have a *gradual enlargement* of the "calcospherites" from the nucleus of the ameloblast inward, while above or outside of the nucleus this substance is in such minute sub-division as to be invisible even to the highest powers of the microscope. Now let us turn to the photographs by which Dr. Andrews seeks to establish his theory. At Fig. 1, page 209 of the issue of the *International Dental Journal* for April, 1897, he shows a

FIG. 9.



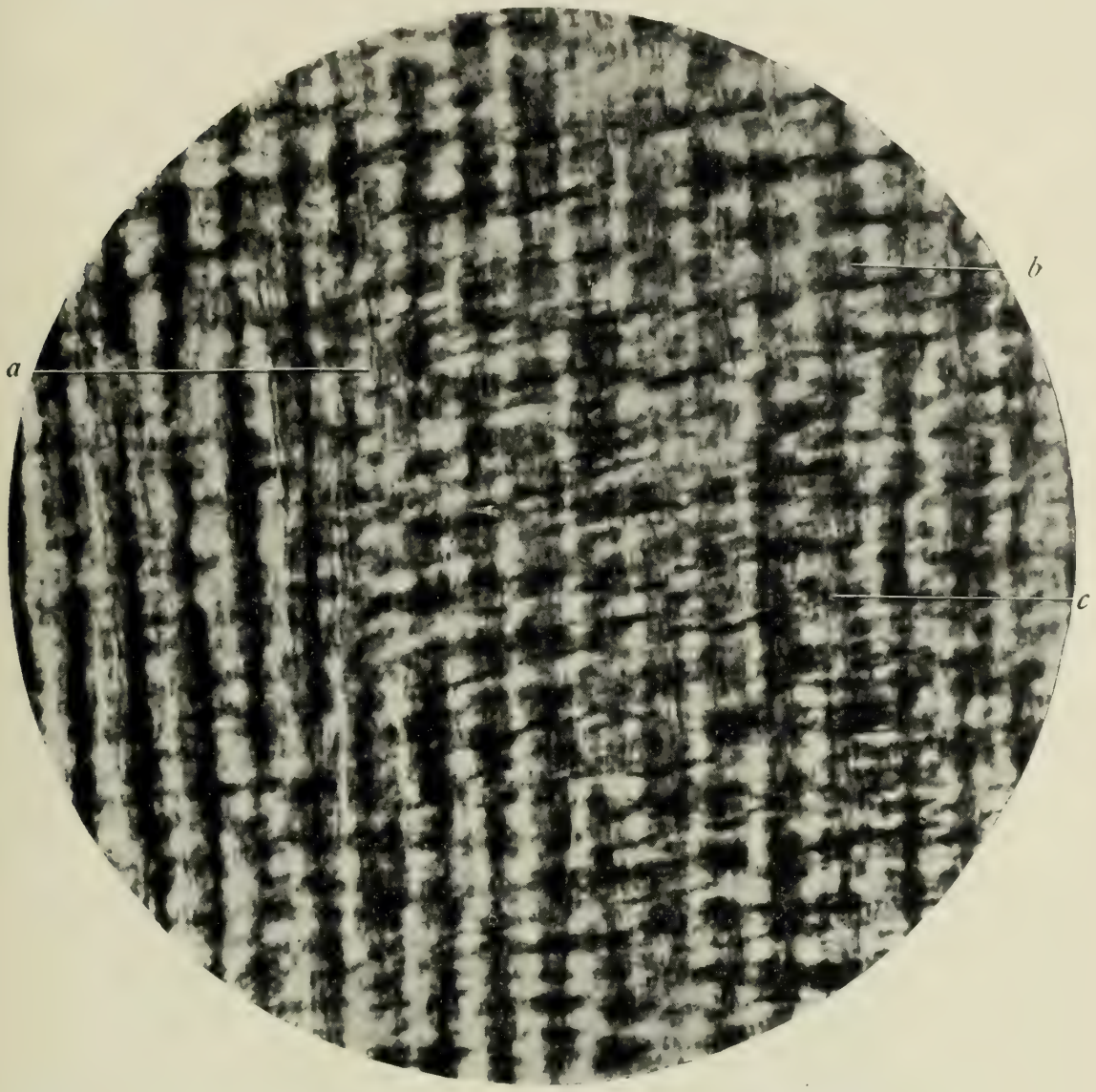
SECTION OF MATURE ENAMEL. × 1500.

a, *d*, Enamel-rods composed of sectional masses united by calcified plasmic or cytoplasmic strings or fibers; *b*, *c*, Calcified cytoplasmic net-work of the same pattern as is shown in the ameloblasts in Fig. 6, at ***a***, of this paper.

photograph of the ameloblasts and the cells of the *stratum intermedium*. At *b* he indicates the calcospherites in the ameloblasts. A casual glance is quite sufficient to show not only that these globular bodies *do not* enlarge as they proceed inwardly along the cell, but that *they are just as clearly seen in the cells of the stratum intermedium as in the ameloblasts, and of the same size*. With reference to this illustration, therefore, I can make use of Dr. Andrews's own language, and say that I can "indorse all that it shows," as the appearances are entirely in conformity with my views, although

diametrically opposed to his. In Fig. 2 of this same article there is shown at *a* the "protoplasmic exudate, cement-substance between the globules," and at *c*, "the forming rod of enamel." If any one will take the trouble to trace along the course of the forming enamel-rod shown toward the spot indicated at *a*, he will see that the rod is continuous with and composed of the same substance as the "protoplasmic exudate" shown at *a*. Here again the appear-

FIG. 10.



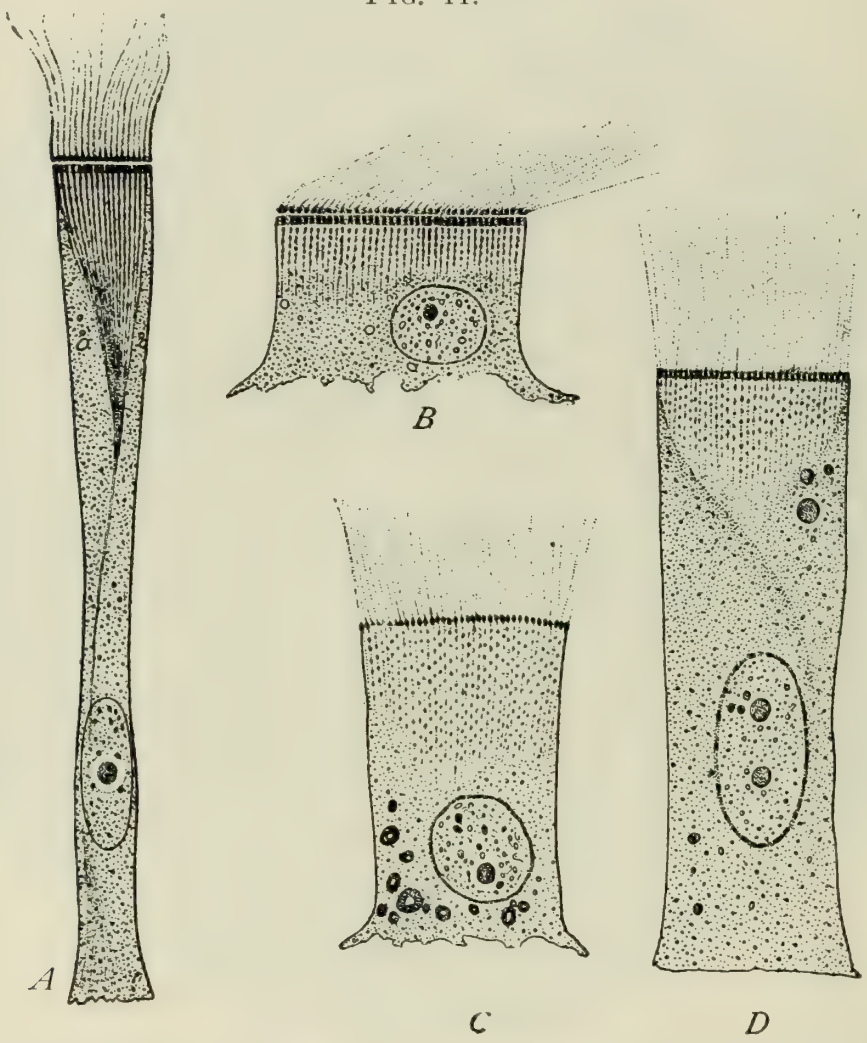
SECTION OF MATURE ENAMEL, SHOWING CALCIFIED CYTOPLASMIC NET-WORK AT *a*, *b*, AND *c*. × 1500.
Compare appearance in ameloblast shown at *a*, Fig. 6 of this paper.

ances contradict Dr. Andrews's theory, and confirm my view that the *calcific material* forming the rod is one and the same with that forming the cement-substance, the difference being that the rod has a substructure of organic matter. In Fig. 3, at *a* and *e*, and in Fig. 4, at *a*, I note appearances evidently identical with what Dr. Andrews has denominated "post-mortem appearances," when shown in my photographs. Consistency, indeed thou art a rare jewel!

There is not the slightest doubt but that the appearances shown

at *c,* in Fig. 6, and at *a,* in Fig. 7, *are* post-mortem. Many of my slides show these peculiarities, but they are never seen when the tissues have been properly prepared and the sections successfully cut. At *a,* in Fig. 8, *b,* in Fig. 9, and *b,* in Fig. 10, of Dr. Andrews's paper he shows appearances in torn and mangled tissues which he says represent the structure I have called the inner ameloblastic membrane. I have already remarked that these appearances have nothing whatever to do with that structure, in proof of which I refer the reader to the photographs accompanying this paper, and to many others which I have published.

FIG. 11.



CILIATED CELLS, SHOWING CYTOPLASMIC FIBRILLÆ TERMINATING IN A ZONE OF PERIPHERAL MICROSOMES TO WHICH THE CILIA ARE ATTACHED. [Engelmann.]

A, from intestinal epithelium of *Anodonta; B*, from gill of *Anodonta; C*, *D*, intestinal epithelium of *Cyclas*.

Nothing can be plainer than that the "fibers" shown in Fig. 11 of Dr. Andrews's paper are simply the ends of the enamel-rods of an obliquely-cut section.

Comparison between the appearances shown in Fig. 12 of Dr. Andrews's last paper and my photographs of the inner ameloblastic membrane are about as nearly impossible as they would be between a map of the zodiac and a skein of yarn.

I am speaking of a definite structure which is always of extreme thinness, while he shows a variety of appearances, some of which

are *post-mortem* and accidental, occupying a space as wide as or wider than the band of the ameloblasts.

The views which I have presented of the phenomena of enamel development substantially combine the two opposing theories which have been advocated for many years. The cell-calcification theory of Tomes and others is seen to be true to the extent that the cytoplasm of the cell is calcified as the organic substructure of the tissue, while the formation of the albumin-like calcific-bearing substance, which constitutes much the larger part of enamel, is essentially a process of secretion, or of secretion and excretion.

DENTAL ORGANIZATIONS.

BY JAMES TRUMAN, D.D.S., PHILADELPHIA, PA.

(Read before the Dental Society of the State of New York, May 12, 1897.)

THE subject of organization has occupied the professional mind the past year, largely to the exclusion of more serious topics, and it is questionable whether the matter has not been thoroughly written up and exhausted. While this is, in part, true, it still remains the fact that the majority of the active workers in dentistry are mentally very much unsettled in regard to the best methods to adopt to maintain this section of the educational labor, for it is assumed that organized dental associative work is a part of post-graduate education and supplements the product of the schools.

So much thought has been given to dental associations that very little time in the present or the past has been allotted to the consideration of the best methods of attaining the real end and aim of these efforts, and it seems that the subject ought not to descend to mere platitudes, but should be a living, active thought, energizing our lives and practice and inducing improved methods to meet the ever-changing conditions of dentistry and its environments.

When we consider the paucity in numbers of dentists who take part in organizations or scientific work in general, as compared to the thousands who practice the calling as an art, there comes, involuntarily, a feeling of discouragement, and the question naturally arises to the mind, of what use is all this effort of local, state, and national organizations, for they can at best but influence a small minority of those practicing dentistry in the United States or elsewhere? While this query has some force, and doubtless influences many, it is not an intelligent question, for the fact that it has an existence in some minds is silent but painfully apparent evidence that individuals fail to read the history of the world's progress aright. The real progressive work of civilization has always been and will always continue to be conducted by the few. While this is true, it furnishes no excuse for that lack of interest in dental organizations so apparent everywhere, and the visible inertia must therefore be met by a constant and corresponding energy upon the side of the minority, that the work may not languish.

It is a cause of wonder that self-interest, the most powerful

motive of the human mind, has not induced a larger percentage of activity in organized effort; yet even this has failed.

An examination of the list of members of the American Dental Association leads to the conclusion that a deplorable apathy exists in sections where it should be least expected. That New England, the best representative section of culture and sound thinking, should fail to send more than sixteen members to the National Association is difficult to understand, but that it exists there, as well as elsewhere, is a fact worthy of our serious consideration. For this, and reasons to be given, the discussion of the subject of organization has become a question of first importance.

The object of professional associative effort is primarily to encourage investigation, and in so far as it fails in this its work is unproductive.

The second part is that connected with legislation: very important, but should never be permitted to occupy and dominate the vital work of the association, which it too often does.

The third object, and which should cover and supplant all others, is the educating influence which the society should give to all members.

The great weakness of dental bodies as scientific centers is that they do not encourage either the first or the last proposition. Original investigation, if taken up at all, is ordinarily not by the members of a given society, but by some one distantly located, and oftentimes a total stranger to the members. It is continually in evidence that some societies rarely have papers from their own members, but scour the country, and even foreign countries, for essays to make up the interest of their meetings. This has its good side, but is it the object of organization to encourage this? The answer must certainly be in the negative.

The demand for papers has become so extended that some are tempted to multiply a single effort, and societies are victimized by essays that may have had a half-dozen previous readings elsewhere. This is a growing evil, and constitutes a continued menace to editors of journals whose readers demand fresh material.

Such work is not educational in the best sense. Men and women are not trained by proxy; neither can societies expect to perform scientific work and have their proceedings count for something who give no encouragement to the younger, thoughtful, working element in their midst. It is a platitude to say all advanced education must proceed from within outward and not from without inward. The latter belongs to the primary training, and has nothing to do with that higher culture so necessary for us in our special field of labor.

So impressed was the essayist with the importance of this that in preparing the original draft of the constitution of the Academy of Stomatology of Philadelphia, when in process of organization, he inserted a clause which made it obligatory for each member to prepare an original paper at least once in two years. That this was, unfortunately, expunged at a later period, and that to the injury of the society, does not militate against its value. The natural

procrastination of the human mind requires a force to set it in motion. This may be an overmastering desire on the part of the individual to solve problems, but if that does not exist, help should be given in this direction, for it is a well-known fact that mental activity develops, as the physical, in proportion as it is fed by active exercise. The society, therefore, that depends solely on outside help and avoids training its own members is a failure, and exists mainly as a social organization and not as a scientific body.

From organizations, as a whole, to national bodies is not an abrupt transition, for both local and national are governed, in degree, by the same law of educational development. There is, however, this difference: the national should be the epitome of all below it; in other words, it should ingather to its folds only those who have made original work a part of their yearly professional existence. This ought to include the larger number of the subordinate societies, but at present it is feared if this rule were adopted the circle would be very select in the upper body. That this, however, should be the final aim and end of the series of organizations, seems to the essayist not to admit of a doubt.

We are met to-day in dentistry with the anomaly of local organizations, district organizations, state organizations, interstate organizations, and two that call themselves national organizations; and, in addition, three others of a nondescript character that assume exclusively legislative functions, as the National Association of Dental Faculties, National Association of Dental Examiners, and the National School of Dental Technics.

With the latter bodies we have nothing to do. They have their special and important work. The others, however, should interest all who value the well-being of their profession. The local societies must necessarily be what the dentistry of the section of the country in which they are located can make of them, but as these dominate the state and national organizations, it is hopeless to expect much advance unless these local bodies are improved, for the stream cannot rise higher than its source, and it is for this reason that the educational process before alluded to becomes of so much importance. It occupies the relation of the primary to the high school, and should be so regarded.

State organizations seem to be a necessity with the modern craze for *more law*, a craze that will be regretted when the people are invested with legal chains that will follow them, as in Continental Europe, from the cradle to the grave. These state bodies are supposed to look after these laws, and this furnishes the chief excuse for their being.

The state of New York is the best organized of any state in the Union. Its entire arrangement of district dental societies is admirable, but the same defects are found here as elsewhere, for this state organization cannot, in the nature of the case, be an educational body any more than other state organizations. They are all interesting and have a value not at all lessened by the facts stated, but they contribute very little to the advancement of our knowledge in dental work.

The question naturally will be asked, Are the national organizations any better? No, they are not, and frequently they fail to make as good a record for faithful labor.

The national body should, in the opinion of the writer, be a strictly scientific body. No one should be admitted to membership therein unless sent up from the subordinate society, and that honor should alone be delegated to those who had accomplished some original work. This would make membership in that body a prize to be sought and worked for, and would in itself constitute the highest incentive to active effort. Members of this higher body should be forced by stringent enactments to maintain the original standing of the organization, and irrelevant discussions should not be tolerated.

This brings us to the consideration of what is best to be done in the coming year in the organization, or rather in the proposed *reorganization* of the dental profession in the United States. It has been long evident that the growth of population West would mean very soon a change from present methods. The cry has been sounded through the land for years, "Give us something better; an organization or organizations that will come once in a given period nearer our homes and be truly national in character!" The other lament, that the American Dental Association has ceased to be national, can hardly be sustained in view of the following facts as regards membership, taken from the report of the meeting at Saratoga Springs, 1896:

An analysis of this shows that

New England had	16	members.
Middle States "	76	"
District of Columbia had	8	"
Southern States had	26	"
Western States "	66	"
	192	"
France had	1	"
	193	"

It will be seen from this that its membership is fairly well distributed; but while this is true, it does not satisfy, and it is feared no organization or series of organizations will exactly meet expectations.

The various propositions made to effect a solution of the difficulties encountered all have their good and weak points, but if union of the Southern and American cannot be effected upon any other basis than the destruction of old methods and old names, then we must rise to meet it with a manly sacrifice of attachments that have grown strong and ever stronger with the lapse of years. The anomaly of two national organizations cannot much longer be tolerated; it is an anachronism in associative effort, and should be repudiated by all who regard the well-being of the profession as paramount to sentiment.

It is doubtful, however, whether the dentists of the country active in the work are prepared for this radical change, and it is to

crystallize thought that your attention is called to-day in this direction. The matter must be met at Old Point Comfort in August next, and if not decided then in some form, will remain an unpleasant factor of dispute for years to come. That the subject will be concluded at that meeting is not to be expected. It involves so many serious problems that in all probability a joint committee must take the subject into serious consideration. To move intelligently, however, it is essential we should have a comprehensive and decided concensus of opinion from all organizations throughout the country.

In the preparation of a plan for a new national organization, if such be finally decided upon, there are some points which, in the opinion of your essayist, should occupy prominent positions.

First, as before stated, delegates should be sent from subordinate bodies in recognition of services performed.

Second. The old idea of permanent membership should be abandoned forever, and the continuance of membership be made dependent on character and work, and the term of office as delegate should not extend beyond five years, subject, however, to reelection.

Dental associations have so long been subservient to medical authority that it is presumed such a proposition will be regarded as almost revolutionary, but it is time we, as a profession, had quit being simply the echo of that venerable mother. We have been in leading-strings long enough; let us then prove our ability to make our own paths through the wilderness of undeveloped ideas, and form the constitutions of our associated bodies so that they may be able to meet and conform themselves to the ever-changing conditions that must be met in the progress of a world's life.

In conclusion, permit the essayist to urge all who can find it convenient to meet with us at Old Point Comfort, for if it should result in the birth of a new organization, happy will they be who may be present and prepared to welcome the Evangel—the messenger of glad tidings—for the profession and be made partakers in the work of development of the associated life of the future.

CORRESPONDENCE.

To the Editor of the Dental Cosmos:

Sir,—Referring to your editorial in this (May) month's Cosmos, entitled "Our National Beggar on Horseback," I thought it a coincidence of which you would like to be informed that about the time you were writing that article a set of resolutions was being prepared from the identical point of view you have so ably expressed, presented to the California State Board of Dental Examiners, and by it adopted at its meeting held in San Francisco, May 8 last. Through the courtesy of a member of the Board, I am able to forward you a copy of said resolutions, which I herewith inclose, to use as you may see proper.

"WHEREAS, The California State Board of Dental Examiners was created by the Legislature of this state by statute, entitled 'An Act to Insure the Better Education of Practitioners of Dental Surgery, and to Regulate the Practice of Dentistry in the State of California.' Approved March 12, 1885; and

"WHEREAS, The duties and powers of said Board of Dental Examiners are expressly and unequivocally defined by said statute; and

"WHEREAS, Said statute makes this Board the sole judge of qualification of candidates for examination and license to practice in this state, and also to determine which dental colleges are reputable, and to specify those which it considers to be disreputable, and therefore cannot delegate such power to any other board or body in this state or other states; and

"WHEREAS, This State Board of Dental Examiners is responsible for its acts to the people of the state of California only, and not to any other state or territory, and therefore cannot, by virtue of said statute, lawfully delegate or compromise its powers and duties to organizations outside of this state; neither does said statute authorize, permit, or suggest any interference, affiliation, alliance, treaty, or obligation with or to the management or decisions of any other state or territorial board of dental examiners; neither does said statute counsel or recommend any like interference, alliance, treaty, or obligation of other state and territorial boards in the management and decisions of said California State Board of Dental Examiners; and

"WHEREAS, This State Board of Dental Examiners has hitherto affiliated with an association known as the National Board of Dental Examiners as a member thereof; and

"WHEREAS, Said National Board of Dental Examiners exists without authority of law, and as such is unrecognized as an official body by this state or the United States; and

"WHEREAS, Such membership of the California State Board of Dental Examiners in the National Board of Dental Examiners has been called in question by the courts of this state, to the great detriment of the California State Board of Dental Examiners:

"*Be it Resolved*, That after due counsel in the premises herein named, it is the opinion of the California State Board of Dental Examiners that its connection with the National Board of Dental Examiners as a member thereof is unlawful and in excess of the powers conferred on said California State Board by said statute, and therefore this Board hereby withdraws its membership from said National Board of Dental Examiners, together with all affiliations, alliance, treaty, compact and compromise of which such membership is expressed or implied by the rules and regulations of said National Board of Dental Examiners;

"*Resolved*, That the secretary of this State Board be directed to forward a copy of these resolutions and the reasons set forth for the same to the National Board of Dental Examiners."

Truly yours,

J. L. ASAY.

SAN JOSE, CAL., May 21, 1897.

PROCEEDINGS OF SOCIETIES.

SEVENTH DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK.

(Continued from page 485.)

FOLLOWING is the discussion on the paper by Dr. F. W. PROSEUS, published in full in the DENTAL COSMOS for June, page 480:

Dr. I. C. EDINGTON, of Rochester, said that many of the points presented by the paper were of practical value, and he was glad

to have heard it. The essayist's mode of preparing the end of the root was good, but he did not agree with him as to the advisability of enlarging the pulp-canal so much. His method was to enlarge it at the pulp-chamber, to allow room for cement, but in the canals thought the tooth-substance stronger than cement would be around the pin, and it was better only to have the canal enlarged sufficiently to receive the pin and a very slight quantity of cement around it.

The fit of a band in a crowning operation is of the very highest importance and a very difficult operation. The tendency is to work the margin of the band under the gum where it would be out of sight. In his opinion it would be better to leave it, say, one-sixteenth of an inch from the gum, and endeavor to get the fit snug as possible. He agreed that gold cap crowns are too frequently used; they were well adapted to anterior teeth in the mouths of men whose mustaches would veil the glare of the gold, but he would not use them in ladies' mouths.

The bridge shown by the essayist, he thought, would be difficult to get to place in the mouth, as the abutments were inclined in such a way that it would be necessary to bend the piece forcing it to place, and impossible to bend it back to a good fit.

Dr. J. H. Beebee, of Rochester, did not favor the use of seamless gold crowns, and did not believe it possible to fit a gold crown that was made in one piece. He thought the best kind of wood for swaging up the crown in was whitewood; it is much better than pine.

Dr. J. W. Cowan, of Genesee, could not see the object of enlarging the root-canal so much; thought just large enough to receive the pin would be better. In making porcelain-faced crowns, he thought it better not to grind the porcelain to a feather-edge, but to leave it slightly round, as there would be less likelihood of its breaking. He had never made a gold anterior tooth, and did not think he ever would.

Dr. C. F. Howell, of Rochester, thought in the bridge described it would have been better to destroy the pulp in the tooth and grind the crown so that it would be parallel to the other abutment, and thus allow the placing of the bridge in position without the necessity of a bending strain.

Dr. A. P. Burkhart, of Dansville, thought it was a mistake in the bridge under discussion that the crowns did not rest upon the gums, as there would be an inevitable tendency to spring the bands away from the teeth. He thought Logan crowns were much stronger than any crown that consisted of porcelain facing and a metal backing. In making crowns with backings he did not bevel the crown as much as the essayist did, nor would he enlarge the pulp-canal so much. He thought gutta-percha better to hold the pin in place than cement.

Dr. F. H. Lee, of Auburn, asked what kind of gutta-percha he used.

Dr. Burkhart said the Premium gutta-percha, made by The S. S. White Dental Manufacturing Company. One reason gutta-

percha was better than cement was because the gutta-percha being heated it would exclude moisture from the canal.

Dr. BEEBEE spoke of the solder to be used in crown- and bridge-work, and asserted that he never found solder made by any manufacturer equal to that which he made for himself. The solders put on the market by the manufacturers were inferior in color, and he did not believe any of them were of the fineness they were claimed to be. His formula is as follows:

7½ dwt. gold coin;
35 gr. pure copper;
25 " " silver;
12 " brass pins.

Melt the gold and silver together and then add the copper, and, as soon as melted, add the pins and *pour at once;* this to avoid vaporization of the zinc that is in the brass. This makes a solder that is 15.428 K fine.* He prefers, however, to make an alloy of

Copper (pure), 53 parts;
Silver " 25 "
Brass pins, 12

Melt silver, add copper, and then add pins, and, as before, pour at once.

This metal he uses to make solder of any degree desired, using pure gold, such as filling scraps. If it is a high-grade, like 18 or 20 carat, he reduces slightly the amount of the alloy and replaces the deducted weight with pure silver. These formulas give a solder that is almost absolutely the color of coin gold.

The following is an excellent rule for alloying gold to any degree of fineness desired: Multiply the weight of pure gold by 24, and divide the product by the desired carat; from the quotient subtract the weight of the gold, and the result will be the weight of the desired alloy. If the gold is not 24-carat fine, find the amount of pure gold it contains and proceed as before, subtracting the weight of the alloy in original mass from the final result, and the last amount will be the amount of alloy to be added.

This is the best rule he knows of for alloying gold. He did not always follow it, but for persons who are not apt in arithmetical calculations it is the easiest general rule.

In closing the discussion, Dr. PROSEUS said the reason he enlarged the canal for the post so much was because he considered that a large body of cement would be less liable to break than a smaller quantity, and in his experience he had never had to recement such a crown. In crowns with porcelain facing he had never had but one to break. Made as represented on the diagram, the bite must come against the backing and the porcelain would not be subject to strain.

In all bridge-work the most difficult objection to overcome is the lodging of food particles between the crowns and the gum. Where there was contact there was sure to be an accumulation, but with the bridge shown the space between the gum and the

*According to our calculation, the formula given will produce a solder of 10.664 K.—ED. DENTAL COSMOS.

crown would be self-cleaning, and in any case easily cleared by the tooth-brush and tooth-pick.

The only case in which a seamless gold crown should be used was where the patient could not afford to have the more expensive crown.

Dr. C. B. IRELAND, of Rochester, read the following paper:

ALKALIES IN DENTISTRY.

Of the therapeutic agents employed by the dentist the alkalies have special interest.

Their adaptation to the remedial requirements of the numerous conditions daily confronting him, involving the immediate and related structures with which his specialty is concerned, rests upon their inherent mechanical and medicinal properties.

All are antacid; possessing, however, unequal capacity for acid neutralization. Some are more or less astringent, and others have the added power of trituration. Of this latter class, chalk, cuttle-fish bone, pumice, talcum, calcined and oxid of magnesia, singly or variously combined with flavoring and coloring to taste, constitute the principal basic elements of a majority of the tooth-powders, or by the addition of glycerol, soap, honey, or simple syrup, in proper proportions, the dental creams, soaps, and pastes of the trade—and, as such components, were chiefly valued, perhaps, up to the beginning of the past decade, merely as mechanical agents to cleanse, polish, or whiten the teeth without taking into account their acid-neutralizing properties. But since the establishment and general acceptance of the chemico-parasitical theory of dental caries, and the time that caries with salivary calculi, erosions of the enamel, hypersensitiveness, and other pathological states of the teeth and associate parts have been regarded as representing a complex of conditions referable to the action of acids, either of local or systemic origin, the alkalies, more especially the non-corrosives, have played a new and important rôle in dental therapy in that their local use, in solution or powder, has been resorted to with the specific purpose in view of limiting or minimizing the ravages of hyperacidity of the buccal fluids. And their value is measured just in proportion to their capacity in this direction and the duration of the alkalinity produced.

In their efforts toward neutralizing the acid condition of the saliva so frequently found, the dental profession have for years very commonly utilized chalk, lime-water, soda bicarbonate, and calcined magnesia, with results, however, not entirely satisfactory.

Recent experimentation in therapeutics, based upon the present accepted etiology of various diseases of dental structures, reveals an important element of deficiency of these agents in meeting the requirements of local treatment,—viz, that none are inherently germicidal or antiseptic.

Besides possessing no inhibitory power over the growth of the acid-producing micro-organisms found in the mouth, their neutralizing action is transient, that of lime-water lasting but about

fifteen minutes; that of soda bicarbonate less than twice as long. The brevity of the alkalinity produced from the use of the former is no surprise when we remember that a teaspoonful represents less than one-tenth of a grain of lime, and that after rinsing the teeth such an infinitesimal amount is left that it is soon carried away or is diluted with the saliva.

All have other objectionable features. The soda bicarbonate, like lime-water, is anything but pleasant to the taste, and, besides, is often painful when applied in powder or saturated solution, while the chalk and calcined magnesia are not only insoluble, but gritty and irritating.

This is a progressive age. In all lines of human endeavor we are constantly looking for anything possessing superior advantages or offering greater certainty of results than from agents or methods hitherto employed.

In the van of this general forward movement and advance of scientific attainment we find the dental profession, and it is to their industrious quest for some non-corrosive alkali that would best subserve their needs that the recent discovery is to be credited, that all the requirements of safety, elegance, permanence, and acid-saturating capacity, combined with antisepsis, are attainable only in a preparation known to the drug trade as milk of magnesia. Chemical examination of this product shows it to be a pure hydrate of magnesia, odorless, tasteless (barring the slightest astringency), in fluid form, and absolutely free from grit. It is homogeneous, milk-like in consistence, and is simply and solely water and magnesia, representing twenty-four grains of magnesia hydroxid in each ounce of distilled water. Being a hydrate, it possesses the greatest possible affinity for acids, a given amount neutralizing an equal volume of fresh lemon-juice. And also as a hydrate, its affinity for water having been thoroughly satisfied, it does not abstract this element from mucous surfaces to which it may be applied, as lime-water, but leaves them moist and velvety after having saturated the acids encountered.

Subsequent to cleaning the teeth, if a teaspoonful or more, undiluted, is taken into the mouth and quietly floated about, the acids present will not only be neutralized, but, owing to its peculiar clinging, semi-gelatinous nature, a slight alkaline film is left on the teeth and in every little pit, fissure, and retaining center of fermentable material, sufficiently adherent to afford protection against acid action for three or four hours during the waking hours, six or more during sleeping hours, and all this without any care being necessary on the part of the patient,—hence its ease of application in children.

The antiseptic property of this preparation has been determined by competent bacteriologists. It has been found by repeated and carefully guarded tests that in tube and plate cultures of the pus-forming staphylococci, lactic acid bacillus, and the mixed bacteria of decayed dentin, no new growths occur under an area covered by it for from twelve to twenty-four hours, as tried, and that even after the milk of magnesia is poured off, the slight alkaline film

remaining is sufficient to restrain indefinitely further bacteriological growth.

Regarding its use, individual cases will govern, but it is probably sufficient to prescribe its employment subsequent to cleansing the teeth three times daily, or perhaps night and morning. But it should certainly be used on retiring, and the patient should be instructed to hold a teaspoonful or more diluted in the mouth for a minute or so.

This will generally insure an alkaline reaction of the buccal fluids until morning.

During pregnancy, when the teeth are suffering severely from being constantly bathed in an acid saliva and frequently flooded with acid regurgitations from the stomach, or in case where buccal and lingual ulcerations are associated with gastro-intestinal acidity, the conjoined local and internal use of this preparation is attended with the most immediate and satisfactory results.

Its local use is of great value after partaking of acid fruits, sour wines, or medicinal acid compounds, and particularly invaluable after drinking milk just before retiring, in preventing the lactic fermentation, which, while it may not produce caries, will, if continued, result in excessively sensitive teeth. That extreme sensitiveness of the teeth caused by the attachment of partial artificial dentures, particularly when clasps are employed, will be markedly minimized when this preparation is employed.

Locally employed as a mouth and tooth wash, milk of magnesia, in taking up the carbon dioxid exhaled and in neutralizing the acids of the mouth that occasion the precipitation and coagulation of the mucin and consequent entanglement of the calcium salts of the saliva, has been found of great service in preventing and retarding the recurrence of salivary calculus after its removal.

You are all quite familiar with the reputed value of this agent in the treatment of erosions, and mere allusion to this use of it is sufficient to meet the purpose of this paper.

Gentlemen, in conclusion, as it is a common observation of yours in the daily pursuit of your profession that the rheumatic, gouty, debilitated, dyspeptic, and the workers in flouring mills, bakeries, and confectionery establishments, when seeking your special services, present more or less plainly the various indices of the action of an acid on the teeth, whether secreted by the mucous and salivary glands, or formed in the mouth by fermentation, or introduced from without, and since the use of the alkalies hitherto employed has been attended with but indifferent results, it is plain that any preparation giving results more satisfactory, coupled with absolute immunity from injury to the general health or to the mucous membranes of the teeth themselves, must of necessity be of interest to you and ultimately enjoy the full confidence of the entire profession.

Discussion.

Dr. J. H. Beebee asked if there was any danger of concretions of lime forming when the use of milk of magnesia is long continued.

Dr. IRELAND said that the preparation is absolutely free from this danger; that it had been before the medical profession for a quarter of a century, and the extended experience was sufficient assurance that its qualities were such as would fully meet the requirements of the dentist.

Discussion closed, and session adjourned till 2.30 P.M.

The afternoon session was called to order promptly at 2.30, and Dr. JAMES DENNISON, of Waterloo, read the following paper:

WHEREIN DOES A COUNTRY DENTIST DIFFER FROM A CITY DENTIST?

To meet the question involved in my subject satisfactorily demands an experience more varied perhaps than mine.

While dealing with it from my own point of view, I would not lose sight of that fact, nor would I by any word cast a reflection upon the honorable course of the city practitioner.

The question, Wherein does a country dentist differ from a city dentist? suggests another: Does the one differ from the other?

In essential points, I think not.

Assuming that both are graduates from the same college, with equal ability and courage, the one, for reasons best appreciated by himself, chooses country practice, while his professional brother prefers the city.

In either case the draft upon the inherent stock of patience which each may possess is, for a time, far from proportionate to the number of patients who may gladden his presence.

But time rewards the faithful, and the best efforts of each are brought to the relief of suffering mankind.

Now, if the city dentist in a given length of time puts more gold in his pocket, and is therefore seemingly more successful from a financial point of view than his country brother, may not the reason be found to rest not so much in his superior efficiency as in the difference of his surroundings?

While the city dentist's heart may prompt him to an observance of the Divine command, to "love his neighbor as himself," the conditions are different.

The draft upon his measure of love is but a summer breeze compared with that of his country brother, who is expected to count his "sisters and his cousins and his aunts" by the score, and for friendship's sake, while relieving the aching tooth and quieting shattered nerves, learn to live and provide for his family, if he has one, from a reserve stock of "Faith" beautiful to lean upon, in theory, and comforting to the soul, but sadly deficient for the demands of the stomach, to say nothing about raiment for the body.

Remuneration, commensurate with labor bestowed, is what we all desire, but, sad to say, do not always receive,—a fact which through business interest makes us wonderfully akin.

Perhaps no profession is more subject to unjust criticism than ours, and the practice of the country dentist being mostly local, he is in closer touch with the pulse of the people with whom he has

to deal; and fortunate is he if he does not find himself indebted for suggestions and information bearing upon his art to a class of individuals "wiser in their generation than the children of light,"—information born of prejudice, which must be met with patient forbearance.

As a prophet is not without honor, save in his own country, so the rural dentist oftentimes labors under a disadvantage.

He is looked upon as being capable of extracting a tooth or performing the ordinary duties dependent upon his profession, but if an intricate piece of work is required his very existence is sometimes ignored and the skill of the city brother is sought, and though it requires that the hand go deeper in the pocket to remunerate this exceptional skill, that counts nothing!

It must be better work, being "city-bred!" Such is the argument which often confronts us.

But "surely the world moves."

Time was when the village blacksmith, being stout of heart and strong of arm, possessed the requisites of a first-class dentist.

I maintain that with the facilities of this progressive age at our very doors, backed by persevering study and practical experience, the country dentist can keep pace with his city brother, and given the confidence that his experience merits, he can meet the requirements of suffering humanity with equal satisfaction.

Equally with his city brother, he can and does avail himself of the benefits derived from water-power and electricity and all modern improvements as applied to nearly all mechanical arts; and though we admit that there may be localities so isolated as to know of these achievements only as dreams, the march of civilization is rapid, and sooner than we think the knowledge of to-day will prove to have been but the stepping-stone to greater possibilities.

We confess to an occasional feeling of envy, almost, of our city brother, in the more luxuriously furnished apartments, the finely equipped laboratory, as well as his closer proximity to the dental depots, thus reducing to a minimum the tedious waiting which a country dentist is often subjected to.

However, there are pleasant features connected with a country dentist's practice, which give us a feeling of satisfaction, and we have visions dancing before our mental eyes of a time when (having served our generation to the best of our ability) with coffers well filled with the gold "left over" from our daily toiling, we shall merit the plaudit,—

"Well done, good and faithful servant" of the people.

Discussion.

Dr. A. P. Burkhart, of Dansville, had in his early professional life thought that the best dental skill was found invariably with the city practitioner, but wider knowledge had caused him to change his opinion. The progress of the rapid and restless civilization of the present age was bringing about a unification of the race and the elimination of the provincial characteristics of different regions.

Travel and intercourse were so frequent and so general that there was no difference, or little, between the people of different parts of our country, and ever-lessening difference between the people of different countries. So it has become in dentistry. The facilities for travel and the abundance of dental literature have made it possible for the dentist of the smaller cities and towns to be, and he often is, quite up to the best of the city dentists in the knowledge of and practice in his profession. It is only necessary for him to avail himself of the opportunities that are brought to his door.

From the standpoint of health, the country dentist has the advantage in the purer air and more abundant opportunities for getting out in it.

The practice of the city dentist seems better, but the necessary expenses are much larger and the balance will probably not vary much.

Dr. G. W. Weld, of New York, as the only representative of the city dentist present, said he had always envied the country dentists for their opportunities for more out-door life, and hunting and fishing, etc. He believed there were as skilled men in one class as in the other, but the closer professional association of the city offered advantages hardly within the reach of those in smaller towns.

Dr. F. H. Lee, of Auburn, had had experience in both country and city, and thought the skill of the country dentist was equal to that of his city brother, and that the charges were as good, too, or, if not, they should be, and might be, if the country dentist would do what he should to uphold them. The lack of professional intercourse is the most serious deprivation the country dentists have.

Discussion closed, and a paper, entitled "Dental Ethics," was read by Dr. H. L. Miller, Rochester, N. Y. An abstract follows:

The word ethics is derived from the Latin word *ethicus*, and in its highest and most complete sense means the science of human duty in general; in a particular class of human duties it becomes political, social, or professional ethics. In its relation to our art it involves our duty to our profession, our patients, and ourselves personally, perhaps in the order that we here give them.

When we recall the self-sacrificing spirit of the fathers of dentistry, Hunter, Harris, and others too numerous to mention here, and the difficulties they encountered in that early day, in their efforts to upbuild our art and place it where it belongs, among the truly scientific professions, how ought we to emulate their example. How disgraceful, how positively sinful is it for any calling themselves dentists to do anything that shall bring discredit on it, or that shall debase or lower it from that exalted position that it has so worthily attained.

We believe that dental colleges, so many of which are springing up in every direction, are largely responsible for the lack of professional ethics. Some years since we read before this society a paper on this subject, in which we claimed that the profession at large ought to demand of the colleges that no pupil should be received without ample evidence being presented to the faculty of a good moral character not only, but that a good education, pre-

ferably a classical one, should be exacted; and, furthermore, we insisted that should a graduate act contrary to a liberal interpretation of the code of ethics, bringing discredit upon his Alma Mater, his diploma should be revoked.

It is not the effect of disregarding the code of ethics so much, as it is in having such little-souled pachydermatous individuals in it who are disposed to disregard the highest good of the profession. All of the different methods of advertising by the dentist smack of the shop, and are beneath a truly scientific and able man in his profession. And what a variety of advertising we see. One has the faculty of appearing before the public as the president of some guild or society. Another banks on his elaborately furnished parlors, with its contents so elegantly displayed, when, perhaps, back of all this is mediocre ability. Another form of advertising is to have one's self interviewed by a reporter. There are many other forms, but why enumerate further? It only is evidence that the general populace is gullible, and these men are fully aware of the fact and propose to profit thereby. There is but little difference among these different methods. They all have the same object in view, lucre only, and if the dear people, many of whom profess to much intelligence, would but employ a little judgment and forethought, they could but conclude that a man who does not respect his profession certainly cannot be expected to respect his patient nor his best interests. So long as professedly intelligent people patronize such disreputable and incapable practitioners, whether in medicine or dentistry, just so long will such practitioners abound, and the ludicrous side of the matter is that these disreputable ones are the only ones that are enabled to retire from practice in consequence of their moneyed acquisitions.

The truly able are modest and retiring in their actions, well knowing how much there is that they have yet to learn. Ignorance is blatant and full of bluff, and always, when opportunity offers, conspicuous. The true professional man of ability respects his fellow-practitioners, if they are respectable, and exemplifies the golden rule. He is disposed to practice the scripture injunction, "Let another man praise thee, and not thine own mouth."

There is a glorious future opening up before our profession, and when our state laws and other influences rid it of its barnacles we may expect greater advancement in the future than the past has shown, much as that has been, and a greater number of *educated* gentlemen will seek its ranks.

Discussion.

Dr. Charles T. Howard, of Rochester, spoke of the law of dental ethics as being founded upon the Golden Rule, and like the Golden Rule it is found to be much easier to talk up than it is to live up to. The same high principle upon which the law of ethics is founded should govern our social and private life as well as professional life.

The law of ethics is our protection, and we should extend the protection to all who come in the sphere of our influence. Should

a patient apply to you for treatment, and you recommend an operation which will be more profitable to you than another which will be more serviceable to the patient, you are violating the code of ethics. The difficult question is how to rid the profession of those who refuse to observe the ethical standard. Education and state law have been suggested, but do not seem to be always effective. Perhaps the education should be given to the people who patronize dentists, and convince them that it is to their interest to patronize those who are professional in their business relations.

A dentist's standard may be determined by his respect for his fellow-practitioners. The dentist who speaks ill, or encourages a patient to speak ill of another dentist, will not be likely to neglect any other dishonorable means for his own gains.

Dr. J. H. Beebee said it was difficult to secure the advance of the ethical standard; the spirit of the age seems to be that he who gets ahead is the best, and everything that advances a man in the race for success seems to be justified. It sometimes seems to him that it would be better if properly qualified dentists could advertise their qualifications, so the people would know them.

Dr. F. W. Proseus did not see the necessity of advertising. His experience had proved that a man could build up a practice even against plenty of competition, and without advertising. If it were practicable for the profession to bring about a better education of the people, or of the school children, in regard to the care of the teeth, the quack would find his occupation gone and the advertising man would be swept out of existence.

Dr. W. W. Belcher agreed with Dr. Beebee that there were two sides to the dental advertising question. He had recently had to replace a piece of bridge-work which was furnished by an advertising firm at an expense to the patient of forty or fifty dollars. He asked the patient how he happened to go to such a place for work, and was told that, being a stranger in the city and not acquainted with the relative merits of the different dentists, he had naturally gone to the one who claimed superiority. It is questionable whether it would not be better for the reputable dentists to announce themselves.

Dr. G. W. Weld thought the code of ethics rather extreme in some directions. A dentist should be allowed to pay royalty for the use of a patented article, and should he originate and patent a useful device he should collect a royalty from those willing to pay for the use of it. He did not think a dentist should have to give away the products of his patient thought for the benefit of those who have done nothing for the profession.

Dr. Miller cast the responsibility of unfit men in the profession upon the colleges. He said that the authorities of the colleges should know something of the antecedents of a man before he was allowed to matriculate, and if character was developed after matriculation which was not entirely satisfactory, the student should not be allowed to graduate, and if by mistake an unworthy man is graduated, there should be some way to rescind the diploma.

The discussion closed, and Dr. J. F. KNAPP, of Geneva, read the following paper:

PREPARATORY WORK IN ARTIFICIAL DENTURES.

Prosthetic dentistry as relating to artificial dentures has become, or always has been, to many practitioners, distasteful and the bugbear of their dental practice, and many have relegated this branch of their art to their laboratory assistant or dental student, with nothing more to guide him in the construction of the denture than a ring of shade-teeth and an impression. This alone is sufficient reason to make this branch of dentistry the bane of dentists. The requirements for the successful practice of dentistry are complex and many, and in all a dentist is called upon to do nothing taxes his resources more than the proper construction of artificial dentures, for it has to do with the restoration of contour, beauty, and expression, and also the lost function of mastication. Dr. Solomons has well said, "The arrangement of the teeth and jaws is in consonance not only with the laws of geometry, physics, and mechanics, but also according to those for the economy of force; but it ought not to be forgotten that beauty and expression play a no less important part in the construction."

No class of patients is in a position to better appreciate the services rendered them than they who, having lost their natural organs of mastication, can have them replaced with a serviceable life-like artificial denture.

Modern bridge-work in dentistry has superseded and taken from artificial dentures some claims of superiority, as firmness of attachment, and perhaps interfering less with articulation, but it falls short in durability, restoring contour, and maintaining cleanliness.

In this paper I wish to speak of what is known as Dr. Holbrook's patent dental plate, a description of which appeared in the September issue of the DENTAL COSMOS, 1892, which system I have used since that time with much satisfaction, and have heard no one else refer to it.

I will describe it in his words:

"*For Lower Dentures.*—Take a full and perfect impression in wax. Press it well to the jaw. In this take the impression again in plaster of Paris. From the bottom of this plaster impression scrape out evenly, to a depth equal to the thickness of a No. 3 separating file, one-sixteenth of an inch nearly, from end to end. Leave about one-fourth inch for the ends of the plate untouched. A cast taken from this will have a raised ridge, and a plate made upon this cast will have an air space between the jaw and plate. This will allow the plate to rest upon the soft tissue on each side of the central bone, like a saddle upon the back of a horse, instead of hanging upon the bone, as it does in most cases. Let the plate run down as deep as possible, and be thick enough to round off the edges inside and out. Do not disturb the sides of impression or cast, for this is the bearing.

"*For Upper Dentures.*—Take the impression as for lower dentures described above. Scrape out from the impression the whole length of the median line. Now find how far the hard bony surface in the roof extends, and scrape off the impression to correspond with the bony part, not heavily, but lightly enough to relieve it from pressure. Do not scrape off where the mouth is soft. A cast taken from this impression will be raised just as much as you have taken from the impression, and the plate will

not rock on the center. Now cut into the cast on a line between the hard and soft palate for the back edge of the plate. Begin a half-inch or less forward of the cut line, and chamber it down to a depth of one-sixteenth of an inch or less, as the case may be. If soft, cut where softest, and less where hard. Be sure and get the back edge of the plate up to the roof snugly; dentists have ever failed to do this. Make the back edge of the plate thin as a case-knife edge, then soften it in hot water (if rubber) and press it firmly to the mouth. Use a strip of fine tea lead around the border of the casts and it will prevent holes in the border of your plate; or, what is better, use for base-plate four or five thicknesses of fine tea lead, each burnished down into the rugæ, and the plate will be of uniform thickness.

"A plaster cast taken from the lower jaw, when the alveolar border is very thin and sharp, will condense when under screw-pressure in bringing the flasks together in rubber or celluloid work; so will a metal cast under heavy blows in swaging a plate. Just as much as the cast settles, just that much will the plate lack of being as deep as the jaw it was designed for, and it will ride upon the central bone. The process described overcomes the difficulty and secures a suction in a large majority of cases. A thick, heavy border will not settle so much, therefore less scraping out is required, but in all cases raise the cast more where thin, less where thick, but do not scrape out too much, and only from the bottom of the impression. When the border is all absorbed and nothing but a flat surface left, you will continue the scraping out around the circle where the bone ought to be. This will give the suction.

"*Upper Plates.*—On the palatine or back side of the cut line for the back edge of the plate you will leave it untouched. Do not disturb it, the cut line being at right angles with the cast; it gives you a guide to go by, showing just how high you are raising the back edge of the plate. This done, your whole plate is a suction."

In preparing models a shaving cup and soap, together with a soft lather brush and a small quantity of vermilion powder, used in mixing paint, has advantages over different forms of varnishes for separating. The soft brush to wipe the lather about the impression; the impression then to be entirely washed off before pouring. A little of the powder sprinkled into the plaster gives it a pink color, showing plainly the line of separation. This, I believe, is a suggestion of Dr. Ottolengui, of New York.

A valuable help I have found in mounting plain teeth is when they are in position on the model before the final waxing up is given to place plaster of Paris on the labial, buccal, and masticating surfaces of the teeth, and with the point of a knife or spatula press it between them, care being used in keeping it away from the necks. It serves the three-fold purpose of preventing teeth changing position when the final waxing-up is given, keeps rubber from between the teeth, and prevents them from loosening in the flask when the wax is removed and the case packed.

Dr. M. L. Fay, of Buffalo, gives the following description, in the December number of the *Dental Digest*, of an easy yet effective mode of making a carved festooned gum for an artificial denture: Arrange the teeth and wax up the case as desired, but leave the necks a little exposed, and with a closely-woven cotton string, which has been drawn through melted wax and allowed to cool, festoon the necks of the teeth by pressing the string between them with any instrument suitable for the purpose. Then with a spatula unite the string to the wax and smooth up the case with a mouth blow-pipe, which will draw the wax up on the string and give pleasing results. Invest and pack the case, removing the string

with the wax. When ready to finish, trim up with a sharp instrument the thin margins of rubber overlapping the teeth, and polish with pumice and stiff brush-wheel.

In conclusion, I will describe a method of securing the occlusion or bite in wax, and taking measurements, which makes the process of "trying in" the unfinished case unnecessary. The most frequent cause of the patient giving an incorrect occlusion into the wax, I believe, is that the wax is attached to a base-plate which will slide about and not remain firmly in place, which gives the patient a feeling of uncertainty. We have all observed how easy it seems to be for a patient to bring the lower jaw back into natural position as soon as the finished denture is inserted, which rests firmly in place. We have in what is known as "Dr. Head's Ideal Dental Base-Plate" a material which will fit the model like a glove, will rest firmly on the jaw, will not soften by the temperature of the mouth, and is as rigid as the finished denture. Wax is placed upon this and is placed in the patient's mouth, with the instruction to close into the wax (do not say bite). The length of the upper lip is marked in the wax if it is to be an upper denture, and the lower if it is to be a lower denture; also mark median line. The base-plate is then removed from the mouth and placed upon the model, and this in turn placed upon an articulator. A piece of medium stiff paper, about one inch in width, is then cut to correspond with the line drawn for length of lip, and with pencil mark median line on edge of paper. Let the paper extend up on the model and mark upon the model top edge of paper, so that paper can be placed back in position when base-plate is removed, to be replaced with one of wax. As a general rule, the incisive edges of incisors fall about two lines below the lip, or a little less than one-sixteenth of an inch. Those of the lower jaw do not show quite as much. The lower edge of the paper will guide you in placing the incisive edges of anterior teeth, also will show whether the patient closed the right distance into the wax, and the articulator can be opened or closed, so that the model or teeth of the opposite or opposing model from the one on which the denture is made will come into position with the edge of the paper, which will be the correct position for the screw of the articulator to be set. The paper should always be marked on the model upon which the denture is to be made; or, in other words, do not make the mistake of marking the paper on the model of the upper jaw when a denture is to be made for the lower.

Discussion.

Dr. J. H. Beebee said that he had used Holbrook's method of preparing impressions previous to pouring the cast for lower dentures, and thinks well of it. He used wax alone and wax and paraffin. As to taking the bite, his method is as follows: He places the plate in the patient's mouth and directs him to hold it to the roof of the mouth and throw his head back as far as possible, then close the mouth. With this procedure the jaw cannot be closed too far forward. We often see old plates worn with comfort

which no more fit the contour of the jaw than a calf's brain would fit the caput of a philosopher, and why? Because the ridge of the jaw has shrunk and the plate rests entirely on the sides. He thinks that for upper plates the method of scraping the impression, as described, may be an advantage, but his plan seemed quite as good. He uses a very thin metal air-chamber which covers a large portion of the hard palate.

In the matter of parting material for use between impression and cast, he had tried soap and varnish with oil, and cold water alone, but preferred sandarac varnish, which may be colored with anilin or any other coloring matter. It may be that we get a cast that is a little smaller than the mouth, but that is no objection, but, on the other hand, rather more to be desired.

Some of our knowing ones of good experience seem to think that it is not desirable, and advocate the use of a non-shrinkable metal for making dies for metal work, but he holds to the old-fashioned zinc, desiring the shrinkage rather than its absence. He does not believe the die rises in the center to a perceptible amount.

There is a point in the packing of rubber; he uses only black rubber, and packs the plate so the rubber will show through.

In regard to packing pink rubber around the gums, he sets the case rather high, so that when the cast is put on there is quite a distance from the upper edge to the parting of the flask. He covers this with a solution of pink rubber, a sheet of pink rubber is placed around this and down between the teeth a little way.

Another thing, he did not believe accurate work could be done without trying the plate in the mouth with the teeth on. His way is to warm the teeth a little and place them in the mouth, and instruct the patient to close the mouth as carefully as possible.

Dr. P. K. Stoddard asked about the Ideal Base-Plate.

Dr. Knapp said the advantage of using this material was that it was so rigid that the lips could not change the shape of the plate after it was fitted to the mouth.

The subject was closed, and Dr. F. M. Rood, of Rochester, gave a description of a method of placing a cap upon a tooth that was within the arch, and placing a porcelain front on it so as to make it appear like a perfect tooth, an abstract of which follows:

We, as dentists, are called upon for the preservation of our patients' teeth as a matter of first importance, but immediately behind this comes one of almost equal importance, namely, the esthetic side of the operation, and to this point I will try to add a help to the operator. I am well aware the placing of a porcelain facing or a gold crown is nothing new. It is the easier way of doing the operation, and where it can be best applied, that I wish to call your attention. We all have occasion to observe the frequent irregularity of the lateral incisors, being inside the arch, usually a short tooth locked back of central incisor and cuspid, a condition of difficult regulation. "What can we do to supply this tedious regulating operation?" The answer is a porcelain facing on a gold crown, restoring the contour of the arch, all done in three hours' time or less, and you can readily see how you can extend the use in

any and many similar conditions with other teeth out of contour of arch. A description of whole crown, briefly stated, is this: For the use of all crowns, and would, from experience, recommend No. 28 gauge gold. Prepare your tooth to be crowned in the usual way of trimming, except the buccal side of tooth. This side grind as much as you feel safe in doing, fit your crown, and you are ready to place the porcelain. Select a tooth known as a short bite with a long appearance, and bevel your porcelain to fit bevel on crown, allowing pins to come on the cusp portion of crown, invest, and with a snip or ball of coin gold to make inside cusp, leave the pins long and do not bend them down on backing, as they help you make the outside cusp. Tip your porcelain with No. 28 gauge gold. Solder and finish as usual. You will readily appreciate the point I make of placing the pins on the cusp part of the tooth instead of having the pins come about the middle of crown for the purpose of soldering.

The meeting adjourned till next day.

Second Day—*Morning Session.*

The society was called to order at 9.30 A.M.

Dr. L. C. Jones, of Wolcott, asked advice in a case which needed regulating. As shown in the models which he exhibited, the upper incisors protruded and the lower were so lengthened as to strike the gums of the uppers.

He was advised to insert a split plate in the upper jaw with a U spring, to expand the arch, and to adjust a harness to the upper incisors, attached to a skull-cap, and thus bring them back to their proper place. Also to expand the lower arch so as to correct the occlusion and make room for the straightening of the lower incisors.

Dr. G. W. Weld, of New York, described his method of filling difficult root-canals with points made of a special soft metal, and before insertion in the canal moistened with a specially-prepared acid mixed with a resinous gum which dissolves the metal point in the canal and forms an aseptic dressing.

Dr. Belcher read the following letter from D. H. Piffard, of Piffard, N. Y.:

The Chemico-Metallic Method of Filling Root-Canals.

Piffard, N. Y., April 22, 1897.

Dr. William W. Belcher, Rochester, N. Y.

Dear Sir,—It is with a great deal of regret that I find it will be hardly possible for me to respond in person to your flattering invitation to address the gentlemen of your association at the coming meeting in Rochester, on April 27 and 28 next, on the chemico-metallic method of filling difficult root-canals. However, always being pleased, so far as my slight knowledge will permit, to aid all seekers after the truth, I will offer you a few facts and comments in connection with this subject. Please bear in mind that I am not a dentist, and must look at the case simply from a chemical point of view. Just here allow me to acknowledge Dr. Weld's kindness in furnishing me with every possible opportunity of investigating his method, and it is not without regret that I find it necessary to contradict some of his statements.

Dr. Weld is wrong in regard to the action of strong acids, such as sulfuric, nitric, and hydrochloric, on the teeth, except in so far as he asserts that the presence of an additional amount of water—this, of course, within certain limits—increases very much the intensity of the action of the acid on the salts composing the teeth; but there are two things that we must not overlook,—that the strongest sulfuric, nitric, or hydrochloric acids that we can obtain in liquid form carry a large percentage of water, and that a tooth in place in the mouth also carries a very considerable amount of moisture, so that even if the acid was anhydrous it would soon obtain from the tooth all the water necessary to carry on its business. Any one of these acids,—sulfuric, nitric, or hydrochloric, the strongest obtainable,—will destroy a human tooth in a few hours' to three days' time, the rapidity of the action depending on circumstances, the size of the tooth, the acid used, the amount of moisture present, the temperature, etc. Immersing a tooth that had been dried in a comparatively high temperature in an air bath for some hours, in the strongest sulfuric acid that I could obtain, I found that a perceptible action commenced almost immediately, and in less than three days it was a complete wreck, but a very small portion of it remaining. The temperature during this time averaged about 70° F. If the temperature had been higher, say 100° F., the action would have been much more rapid. Nitric, hydrochloric, or nitro-hydrochloric acid will destroy a tooth very much more rapidly than will sulfuric, as proved by actual trial. I took a piece of human tooth-enamel about one-quarter by one-eighth by one-sixteenth inch in size, dropped it into a test-tube, and covered it with the dental acid. In an hour's time it had entirely disappeared. The teeth are composed principally of tri-calcic phosphate, commonly called phosphate of lime, and magnesium phosphate, with small percentages of calcium carbonate and fluorid, albumen, moisture, etc. The phosphates of calcium and magnesium are formed by the union of these metals, or rather their oxids, with phosphoric acid. Sulfuric, nitric, and hydrochloric are much more powerful and have a far greater affinity for the metals calcium and magnesium, than has phosphoric acid; therefore, whenever one of these stronger acids is brought in contact with one or more of these phosphates, it displaces the weaker acid, and, taking unto itself and uniting with the metal, forms a sulfate, nitrate, or chlorid, as the case may be. Dr. Weld claims that when a tooth is immersed in strong sulfuric acid an oxid is formed on its surface. He is mistaken; this is impossible. He has simply commenced the manufacture of calcium and magnesium sulfates, and this will continue until the tooth as a tooth ceases to exist, if a sufficient amount of acid be present, unless he separates the contending parties, the sulfuric and phosphoric acids. If the temperature of aqua regia=nitro-hydrochloric acid be slowly raised to a certain point, a decomposition of the two acids will occur, resulting in the formation of nitrosl chlorid, a heavy, deep orange-colored gas, + free chlorin + water. This action can be arrested at any stage before completion by lowering the temperature. If this be done shortly after the decomposition has commenced, you will still have aqua regia, with more or less nitrosl chlorid and chlorin in solution in the mixed acids. The following formula will perhaps explain a little more clearly what occurs when the aqua regia is heated:

Nitric. Hydrochloric. Nitrosl chlorid. Chlorin. Water.

$$HNO_3 + 3\,HCL = NOCL + CL_2 + 2\,H_2O.$$

This appears to me to be what Dr. Weld has done, and then to this mixture of acids and gases he adds what he calls a gum-resinous substance. Of what utility this gum-resinous substance can be in this connection I am free to admit that I cannot see, except it be to weaken the mixed acids and gases to the extent of the amount of energy that they have expended in splitting up that gum-resinous substance into various groups and elements, uniting with one or more, or all, of these groups and elements to form other substances. Undoubtedly a tooth-cavity into which the dental acid has been introduced would be pretty thoroughly disinfected, but so far as disinfection is concerned, why not use any one of the far less harmful and just as efficacious solutions of the hypochlorites of sodium or calcium, formic aldehyde, hydrogen dioxid, et al.? Following Dr. Weld's instruc-

tions, I filled a dry tooth, then allowed it to rest for several hours. I then removed the broach and examined it very closely. I found that it had been acted upon but very slightly, if at all. The combined acids and gases had expended their energy on the tooth-substance. I then weighed a broach, inserted it in a root-canal, and treated it with a drop of the acid, and, as before, moved it out and in several times, so as to carry the acid into the extremity of the canal, then left the whole undisturbed for some hours, then during early evening dropped the tooth, with broach still in place, into water and let it remain over night. Next morning, on removing the tooth from the water and inverting it, the broach dropped out, showing that the salts, or at least a large portion of them, surrounding it in the cavity had been dissolved by the water. I thoroughly dried the broach and weighed it, but could note no change in weight. The root-canal in this tooth appeared to be quite straight. The tooth was a freshly extracted one that I had preserved for several days until I had an opportunity of using it, in as nearly a normal condition as possible, so far as moisture was concerned, by wrapping it up in a piece of fresh beef.

Under the conditions that obtain in a root-canal while it is being filled, or subsequent to the filling, by the chemico-metallic method, I cannot see how it is possible for an albuminate to be formed. There may be a breaking-up of the albumin and the formation of other bodies, but I doubt even this, on account of the greater affinity which exists between said acids and gases and the calcium and magnesium salts. The first action of a strong acid on albumin is, as Dr. Weld states, to coagulate it, but perhaps the doctor has not noticed that if the acid and albumin are kept in contact for some little time, say an hour or more, the albumin will be decomposed. This applies to the action of the dental as well as other strong acids. By the chemico-metallic method we have a cavity filled partially with the metallic alloy broach and partially with unaltered tooth-substance, mixed with more or less nitrates and chlorids and a small percentage of other substances. All nitrates are soluble in water, and the calcium and magnesium chlorids are extremely so. Now, will not these salts in time be dissolved in the fluids that circulate through the tooth, and be carried off into the general circulation, leaving the broach with a small amount of unaltered tooth-substance, etc., to partially fill the cavity and perhaps make future trouble?

If these few crude and hasty remarks and suggestions are of any service to you, you are welcome to put them to whatever use you may see fit. Again thanking you for your thoroughly appreciated invitation, and hoping that you may have a very pleasant and successful meeting, I remain,

Very sincerely yours,

D. H. Piffard.

Dr. H. S. Miller asked what object there was for the use of the resinous gum in connection with these fillings.

Dr. Weld said it was to retard the action of the acid on the tooth-substance. It may do it as Mr. Piffard says, or it may in some other way. The chemical action has not been determined certainly. The action of the acid upon the metal may form an oxid or a chlorid. The gum-resinous substance controls the action of the acid upon the tooth. Of course, the zinc in the canal also controls the action of the acid on the tooth-substance. It seems evident that the zinc is more easily attacked by the acid than the tooth, and this will control the action on the tooth. It did not seem to him that Mr. Piffard had proven that the action was destructive to the substance of the tooth.

Dr. Stoddard asked whether Dr. Weld had ever extracted a root that had been filled in this manner, and what was the condition. Was it not possible that the acid would form an abscess?

Dr. Weld said that the condition of the root was like those

which he showed, where the canal was filled perfectly with the metal point.

The generation of gas was at the upper part of the root-chamber, and did not extend to the apex of the root. His combination of acids was the result of many experiments, but if there was any other acid or mixture of acids which would be better he would be glad to use it.

Dr. C. H. NICHOLSON asked what he would do with an abscessed root.

Dr. WELD said he would first treat the abscess and then fill the root.

(To be continued.)

UNION MEETING OF THE MARYLAND STATE DENTAL ASSOCIATION, WASHINGTON CITY DENTAL SOCIETY, AND VIRGINIA STATE DENTAL ASSOCIATION.

(Continued from page 497.)

SECOND DAY—*Morning Session.*

THE convention was called to order at 10 o'clock, Dr. D. E. Wiber, of Washington, in the chair.

In the absence of the author, the following paper by Dr. RICHARD GRADY, of Baltimore, was read:

COMPETITIVE EXAMINATIONS FOR SCHOLARSHIPS.

For years it has been a feature in many (if not all) dental schools to receive beneficiary students, on the payment of half the tuition fees, when they have been recommended by the associations in the several states or otherwise. Lengthening the time for graduation has increased the expenses incident to three courses of lectures, and this, it is said, "works hardships on many young men who are struggling against poverty to obtain an education and are unable to meet the heavy expenses." Time will not be taken to discuss the question of "admitting poor young men to the colleges," or, in another form, "Shall poor dental students be encouraged?" nor the statement that "most dental students enter college without proper preparation."

Statistics are not at command, from the fifty-three institutions teaching dentistry, as to the number of applicants for scholarships; but, applying the information on hand, there are four desiring to attend the dental colleges (as beneficiary students) to one appointed. Some dental schools have furnished for this paper the number of students and the number of beneficiaries in 1896-97. If a similar proportion prevailed in the thirty-five colleges reporting to the Association of Dental Faculties (varying from nine and one-half to twenty-one per cent. and averaging nearly fourteen per cent.), there were from 516 to 1161 beneficiary students, say more than 750, included in the 5532 matriculates during the year 1895-96. There are aspects of the system which it is impossible to exagger-

ate. What is the reason and what is the object for beneficiary students?

Previous to the adoption, by the National Association of Dental Examiners and the National Association of Dental Faculties, of the "rule prohibiting colleges from receiving beneficiary students recommended by state boards and associations," the Committee on Dental Education of the Maryland State Dental Association (of which I am chairman) had awarded (early in July, 1896) scholarships in the three dental schools located in Baltimore.

It is the first time that the state association has insisted upon a standard of education on the part of those entering as beneficiary students. It has been proposed that the examination should be fully equivalent to that for graduation at the Baltimore Polytechnic Institute (similar to the manual training schools of St. Louis, Chicago, Philadelphia), which provides for an adequate preliminary education and skill in the use of instruments; but the committee, anxious to make a beginning, gave an examination so elementary that no exception could be taken to it by anybody with a common school education. No preliminary acquaintance with the theory and practice of dentistry was required, and the examination was confined to three things: (1) Writing a letter; (2) an exercise in dictation; (3) solving four problems in fractions. There were eleven applicants, and three were selected according to their standing under the competitive examination. Respecting the plan, the president of the Maryland State Board of Dental Examiners wrote: "Permit me to add my indorsement, for whatever it may be worth, to the course your committee has taken concerning scholarships to our dental schools; it is certainly a move in the right direction and must be appreciated."

The examination follows:

Composition.—Write a letter to the committee mentioning,—

(1) Your name, age, residence.

(2) The dental school in which you desire the scholarship.

(3) What studies you were pursuing when you left school (giving its name and location).

(4) The names and addresses of two persons who would be willing to recommend you.

(5) Why you have decided to study dentistry.

Arithmetic (To be read by title).

(1) If a watch is $18\frac{3}{4}$ carats fine, how much pure gold is in it?

(2) Divide 17-18 into two parts, one of which is $2\frac{1}{2}$ times the other.

(3) If I pay $62\frac{1}{2}$ cents a cord for sawing wood 4 feet long into three pieces, how much more should I pay for sawing wood 8 feet long into pieces the same length?

(4) A man sold 2-5 of 10-11 of his stock; how many fifths of 10-11 remained?

Dictation.

THE NEW SCHEDULE.

The matriculation examination shall be upon the following subjects:

(1) Latin.—Translation from specified books; grammatical questions; easy sentences of English to be translated into Latin.

(2) English.—Writing from dictation; questions on English grammar, including parsing and the analysis of sentences; a short essay to be written on a subject announced at the time of the examination.

(3) Arithmetic.—As much as is contained in Smith's arithmetic.

(4) Algebra.—Fundamental principles; factoring; factions; indices; surds; simple equations and quadratic equations with problems involving their use; arithmetical progression; geometrical progression.

(5) Geometry.—First four books of Euclid, with easy exercises.

(6) Physics.—As much as is contained in Gage's Introduction to Physical Science.

(7) One of the following subjects at the option of the candidate:

(a) Greek.—Translation from a specified book, with questions in grammar.

(b) French.—An examination similar to that in Latin.

(c) German.—An examination similar to that in Latin.

(d) History.—History of England, or general history as in Swinton's Outlines of the World's History.

(e) Chemistry.—As much as is contained in Williams's "Introduction to Chemical Science."

It is recommended that the board be authorized to secure the consent of the Governor-in-Council to the changes in the curriculum as soon as possible, but that the new schedule shall not go into force until October 1, 1896.

Resolved, That the matriculation examination for the coming year be in all respects the same as last year.

It will be observed that the recommendation of the Association of Dental Examiners adopted by the Association of Dental Faculties prohibits beneficiary students of "state boards and associations" only.

The outlook is that the awarding of scholarships by the colleges themselves, for exceptional merit and because of character and promise and not because pecuniary assistance is needed, will take the place of the appointment of (so-called) beneficiary students who have been nominated by personal influence, or on the plea of poverty, or because the candidate is a preacher's son, or because the quota from the state in which the applicant resides is full and he is recognized as an actual resident of another state.

Recently the subject has received formal consideration in the Department of Dentistry of the University of Pennsylvania, and examinations for two scholarships will be held next September. I am indebted to Dr. Edward C. Kirk, the Dean of the Dental Faculty, for what follows; and, inasmuch as the subject is of general interest and is treated by an abler hand than mine, what Dr. Kirk has written is quoted at length, in the belief that, when published, it will be suggestive to other dental institutions. He says,—

"I thought perhaps it might be of interest to you, as well as relevant to your subject, to send you our circular setting forth the scope of the subjects which form the basis of our competitive examinations for scholarships in dentistry.

"We are constantly applied to by individuals for free scholarships in this department. The basis of the request is usually that the candidate is without means to pay for his tuition. The demands for free scholarships became so numerous and pressing that a committee of the Faculty was appointed to take cognizance of the matter and decide upon some means for meeting the difficulty. After

much deliberation it was decided to ask the Board of Trustees to create two University Scholarships in Dentistry, to be awarded annually on the results of a competitive examination, the basis of which examination should be the equivalent of that demanded for entrance upon one of the courses in the college department.

"The Board of Trustees have granted the request of the Faculty, and the basis of the examination is that set forth in the inclosed circular, and is the same as is required for entrance upon either the mechanical, electrical, or civil engineering courses of the college department. The competitive examination for these scholarships is open to all applicants without restriction, and they will be awarded to the candidates attaining the highest examination results. The Faculty feels that the mere question of inability to pay tuition fees should not be a governing motive in the granting of scholarships, but that they should be granted rather upon the basis of merit. Our desire, where we furnish free tuition, is to furnish it only to the very best men, who will be a credit to their profession and their Alma Mater, regardless of the financial question. The only other free scholarships granted in dentistry are those granted under our contract with the Board of Education of this city, numbering two each year, which are given to meritorious graduates of our High School or our Manual Training School. With respect to these men, I may say that graduates of the schools named are prepared to pass the matriculate examination of the college department of this university, as set forth in the annual catalogue; and where they have attained a certain percentage are admitted upon certificate. No other scholarships are granted in this department."

Dr. D. D. Smith, of Philadelphia, read the following paper:

Pericemental Abscess.

The form of alveolar abscess here denominated pericemental abscess, in so far as the author is aware, has heretofore never been described, if, indeed, it has been distinctly recognized. It is an affection by no means common, and yet it occurs with a frequency to demand recognition and careful description.

Whilst the cause or causes of this trouble may be difficult of explanation, when once developed its recognition and diagnosis is comparatively easy and certain. The writer saw a number of cases of this affection before distinguishing between it and the ordinary form of alveolar abscess, and it required repeated failures in treatment before its distinguishing peculiarities were recognized. When once clearly differentiated it stands prominent and alone as a pathological condition of the teeth. It occurs on the pericementum of teeth with living pulps, as frequently perhaps as on those with pulps devitalized, and yet there are connected with it distinguishing characteristics clearly demonstrating its presence in either case. This abscess is never found at the apex of a root. It has no external fistula, neither is it accompanied by marked inflammatory manifestations nor by swelling. There is no dis-

charge of pus from it, neither odor emanating from it in the canals of devitalized roots with which it may be associated; there is no marked increase of inflammation from medicating or tightly stopping such canals. It occurs more frequently in connection with upper than with lower teeth.

The seat of the abscess, from the author's observation, is always adjacent to some irregular formation in single-rooted teeth, and just above the bifurcation on the inner side of one of the roots of other classes of teeth. The sac of the abscess, if it may be spoken of as a sac, is always tightly adherent to the pericementum, and on extraction comes away entire on the root. The sac appears to be of an irregular glandular formation, not uncommonly having free globules of pus distributed over the surface of the glandular mass.

The diagnostic symptoms are, first, a dull, almost constant pain in the tooth and parts immediately adjacent; the root more or less loose, with pain increased markedly when pressure is made upon it in certain directions; the inflammatory symptoms are not at all commensurate with the pain nor with the apprehensions of the patient; little or no swelling attends it and no pus discharge. No relief is experienced from usual methods of treatment, as opening into the root or from external applications.

It is perhaps more likely to be confounded with pericementitis than with any other trouble, although there might be cases where it would be difficult to distinguish between it and root-absorption, especially in upper molars.

Differential Diagnosis.

Pericementitis.	*Pericemental Abscess.*
Pain on pressure acute, and alike in all directions.	Pain on pressure less acute and more marked in certain directions than in others.
Looseness not great.	Looseness quite marked.
Pain on tapping very great.	Pain from tapping not great.
Pain increasing from the first, and accompanied with inflammation and swelling.	Pain not markedly increased with time, but a feeling of apprehension induced; inflammatory symptoms not marked, and no swelling.
Occurs generally in connection with devitalized teeth and roots.	Occurs in connection with teeth having living pulp as frequently as with roots having devitalized pulp.
Some known local irritant the cause, as irritated or putrescent pulp, a blow, or wedging.	No recognized cause.

Pericemental abscess occurs usually in anemics. Prognosis always unfavorable. Have never been able to afford permanent nor positive relief. Remedy, extraction.

Dr. Smith described the following cases:

A gentleman presented with a lower bicuspid which had for some time been giving him much trouble. Upon examination I supposed it was the usual alveolar abscess, and treated it as such. There was no relief attending it as in ordinary cases. After about a week of treatment the patient failed to return, and had the tooth extracted. Am now satisfied that this was a case of pericemental abscess.

The second case was a lady, the tooth an upper bicuspid. I thought the treatment would be simple, and opened up the root and stopped it with medicated cotton dressing. Upon withdrawal of the cotton from the root there was not the slightest evidence of odor, but the tooth continued painful. Treatment was continued for three weeks, and the tooth was then extracted. Upon examination I found a little depression on the root of the tooth where a sac was located tightly adherent to the tooth. I recognized in it a distinct form of alveolar abscess that had no connection with the pulp-canal of the tooth. The matter passed from my mind until, having a number of cases, I classed them as a distinct form of abscess. Subsequently other cases came into view, and the peculiar diagnostic symptoms of almost continued but not severe pain, little inflammation, no swelling, no odor, and no results from treatment led to the aggregation and classification of the facts set forth in the paper.

A third and most interesting case was that of a medical gentleman who presented with an uneasy sensation, hardly to be classed as *pain*, in a second left upper molar. Upon examination the tooth and parts adjacent appeared normal, except a very slight looseness of the tooth and a barely distinguishable response to tapping and pressure. As there were no symptoms pointing to periosteal trouble, it was ascribed to the sudden biting upon some hard substance, and I thought the pain was more imaginary than real. Iodin was applied to the gum over the tooth, and the case dismissed. The following day the patient returned with the same local symptoms, but with a decided conviction that there was something the matter with the tooth. The case was seen every day for about a week, and treated only with applications to the gum. Hot and cold applications directly to the tooth gave rise to no unusual sensations of pain. There was no evidence of inflammation, no swelling, and no periostitis. The pain was by no means intense, but had become almost continuous; the tooth was more loose and decidedly sore when pressed, and the pulp was deemed to be alive. It was at this stage of the trouble that this peculiar form of abscess, which we now call pericemental abscess, was diagnosed. To make absolutely sure that the pulp was not at fault, I decided to open into it, and proceeded to drill through a small crown filling. Reaching the dentin, I found not only that the pulp was alive, but that the whole tooth-bone was in an exalted state of sensibility. Assured now that my diagnosis was correct and that I had to deal with a pericemental abscess in connection with a tooth having a living pulp, I determined to reach the seat of the abscess and evacuate the pus, if possible. Accordingly the pulp was destroyed and removed with no unusual incident or discomfort. The entire removal was effected the day following the application. This caused no apparent increase or abatement of the abscess symptoms. I now drilled entirely through the tooth, reaching the alveolus at the point of bifurcation, but failed entirely to evacuate any pus or to develop any odor.

The third day after the opening was made upon the alveolus there were unmistakable signs of trouble in the antrum, and an opening was easily made into it just in front of this molar tooth. Unwilling to risk further treatment, the offending molar was extracted and the cause of all this trouble made apparent. Just above the opening which had been made with the drill, and closely adherent to the inner side of the distal buccal root, was the peculiar but well-developed lobular sac of the abscess, having small globules of pus disseminated over its surface. The night following the removal of the tooth there was a copious discharge from the antrum through the left nostril. The opening through the alveolus to the antrum was enlarged, and treatment instituted through it. The cavity was syringed twice daily with phénol sodique, diluted about one-half with water, and at the end of two weeks the case was discharged entirely well. From my experience, I believe the true pericemental abscess to be incurable, and the sooner the extraction after it is recognized the better.

Discussion.

Dr. H. C. THOMPSON said that the paper describes one of those conditions which nonplus us as dentists. We have all seen such

cases and have similarly failed in their treatment. His conclusion, based upon experience, is that such cases usually occur upon a class of teeth which are very hard, in a patient of an anemic condition.

The history of the disease is probably, first, hypertrophy of the pericementum, followed by retrograde metamorphosis and breaking down of the structure. Treatment at present seems hopeless. The abscess, in his experience, was most frequently situated in the bifurcation of the roots.

He described the treatment he had tried with one case of this character. Making an opening through the alveolar wall and using a scaler, he scraped that portion of the tooth that was affected clean as possible, then treated it with nitrate of silver, but got only temporary relief. He also spoke of other cases where treatment had failed to give permanent relief.

Dr. J. V. HALLER, of Wytheville, Va., had been long convinced that an abscess was never found on a tooth with a single root and a live pulp; they were always on the line of a dead pulp.

Dr. A. W. LAKIN, of Boonsboro, Md., did not believe that a sac, which contained no pus, should be called an abscess. There was a distinct difference between the sac of an abscess at the end of a root and such a sac as described in the paper read. He deplored the lack of exactness in much of what passes as scientific work in dentistry. It would be much better if more exact methods of investigation and a more exact nomenclature were used. He asked if Dr. Smith had ever seen such a case, where the seat of the trouble was in the bifurcation of the root, when the bifurcation was not more or less exposed. He also thought that it would surely cause trouble to bore a hole through into the space between the roots as described.

Dr. SMITH said the statement he had made in regard to this case was that the tooth was apparently in a perfectly normal condition and continued so for more than a week. He had often seen teeth that had been drilled and gold pushed through the opening in the apex of the root, and he remembered one case in which the drill had passed through the side of the root and gold pushed through this artificial opening, and yet no trouble followed. In his case described the disease was fully developed before he had drilled the tooth. The effort to reach the trouble by drilling down to it was a last effort for relief before he should extract the tooth. Drilling through, therefore, surely did not cause the trouble, for we can drill such a hole and yet by filling escape trouble. The late Dr. Atkinson, giving directions about drilling out pulp-canals, said to push the drill until you get blood. This, however, Dr. Smith thought bad treatment, though evil effects from it were not inevitable.

When he looked back over his practice and thought of the cases where this thickened membrane, or, as he had called it, sac, with no discharge and yet containing pus, had existed, he believed others of the older practitioners must have had such cases, and if they would cast their thoughts back over their practice they would

remember them. Some might think that in the case described the inflammation in the antrum caused all the trouble, but this was not so, as the antral trouble did not begin till after the tooth was removed.

He had described the condition in the paper and given the history of his unsuccessful efforts to treat the same, but had not attempted to give the etiology of the trouble. He would leave that to the science of the profession.

Dr. M. F. FINLEY, of Washington, had never seen such a case as Dr. Smith described, but had seen quite extensive absorption along the roots of teeth which had been troublesome, and he wondered if this condition would result in such absorption.

In regard to the possibilities of abscesses on living teeth, he had had several cases both on single-rooted teeth and others. One patient had two cuspids on the lower jaw which were very painful. There was much recession of the gums, so that one-half of the roots were exposed and the teeth were consequently loosened. He thought there were permanent abscesses and started to drill through the canal, but found the pulp still alive. His final resource was to extract the teeth.

Dr. H. C. THOMPSON, of Washington, said he had a patient present who had an abscess on a tooth the pulp of which was still alive. He had treated the abscess through the alveolar wall.

Dr. E. P. KEECH, of Baltimore, spoke of a second superior molar which he had filled within a few months, at which time it was very sensitive, yet twenty years ago it had an abscess on it.

He was very much obliged to Dr. Smith for this paper. He has taken ground which was undoubtedly true. In his practice he had had a number of such cases, both on teeth with a single root and with more than one root, which were living and yet had such abscesses. In such case he usually found that there was absorption of the alveolus to a degree. The great majority of the cases are absolutely hopeless so far as their cure is concerned. Temporary relief may be gained, but cure is impossible. If the patient's condition is good the tooth may be tolerated for quite a period, but if the general tone is lowered extraction will become necessary in a short time.

He thought, however, that in the case that had antral trouble associated with it Dr. Smith had made a mistaken diagnosis, and that the antral trouble originated with the first molar, which was a devitalized tooth, and that it extended to the second molar and caused the pain. The treatment was correct, could not have been better.

Dr. SMITH was confident that there was no mistake in diagnosis, as, after extracting the first molar, he examined the second and was sure that it was not the cause of the antral trouble.

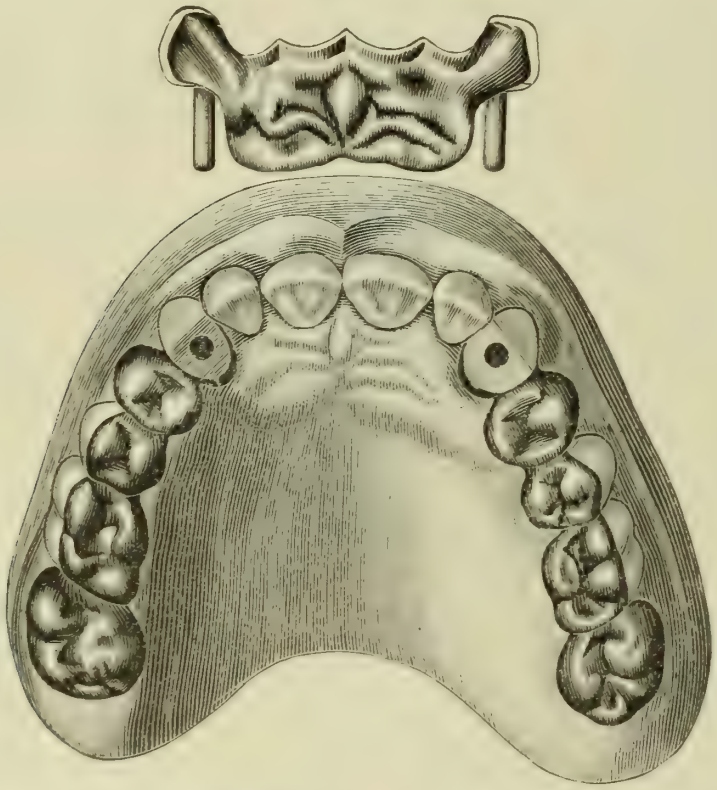
Discussion closed, and Dr. F. W. SCHLOENDORN read the following paper:

Special Cases of Bridge-work.

Crown- and bridge-work is not a new study or art. For a number of years I have been more and more attracted by it, and have given it special attention in my practice. The most skillful men in the profession have, through study and improvement, brought this branch of dental art to a point at which there can be no longer any question as to the fact that bridge-work is the proper method of replacing lost teeth. As far as I am concerned, I am sure that no form of operation has met with better success, or has been as satisfactory to me, as well as to my patients, as bridge-work.

My own experience has proven to me, however, that any one who wishes to make a success in this branch must not confine

Fig. 1.

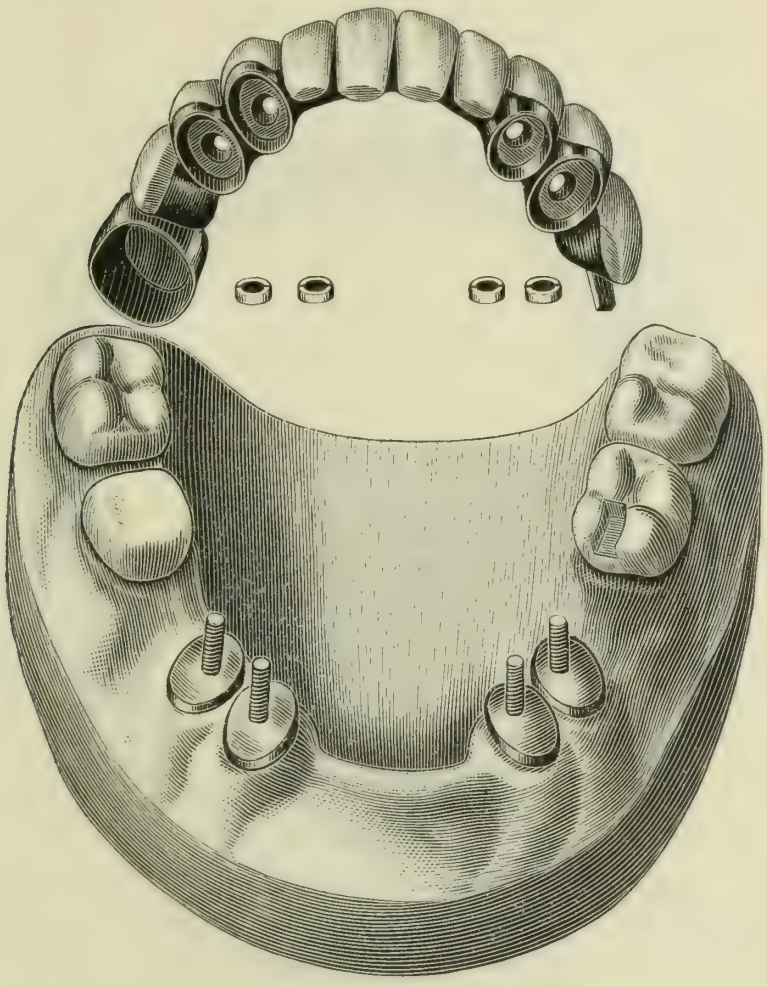


himself exclusively to one method. We know that every case is different, and in consequence requires a special study and a method of its own. I shall take the liberty of illustrating this point of view by a few specimens. They are duplicates of bridge-work which I made and which have been worn with great satisfaction to patients for several years.

No. 1 was a patient who came to me wearing a bridge-work on both sides of upper jaw from the first bicuspid to the second molar (inclusive). This work was one which in all respects was perfectly and beautifully done, but yet was about to lose its durability, as the teeth upon which the work was fastened became loose. The patient still possessed her six front teeth, and, to accomplish my ideas, had to sacrifice both cuspids. The patient, a very intelligent lady, was entirely satisfied, as I explained to her that this was the only way to repair the work. To begin with I removed the bridge-work, then cut off both cuspids, treated and filled

them, prepared a cap with a cylinder, fitted over the root, then I replaced the bridge-work temporarily, and joined the bridge-work to the cap with wax, invested it in plaster of Paris and soldered the same, then cemented both parts of bridge-work. Now I swaged a cap over the other, which was soldered to the bridge-work, fixed a pivot of gold-iridium which was cleft, and fitted exactly into the cylinder. The cap and pivot were then soldered together and fixed upon the cuspid cap. Then I took the porcelain facing, which was backed with gold, fastened it to the cap and pivot, and

FIG. 2.



soldered both parts together. Then I set the cuspids into their position, took a plaster impression (of the front part of the mouth), and formed from this a zinc model, then swaged upon it a gold plate, which was soldered to both cuspids and combined them. The plate with the cuspids, of course, was removable; this completed the work.

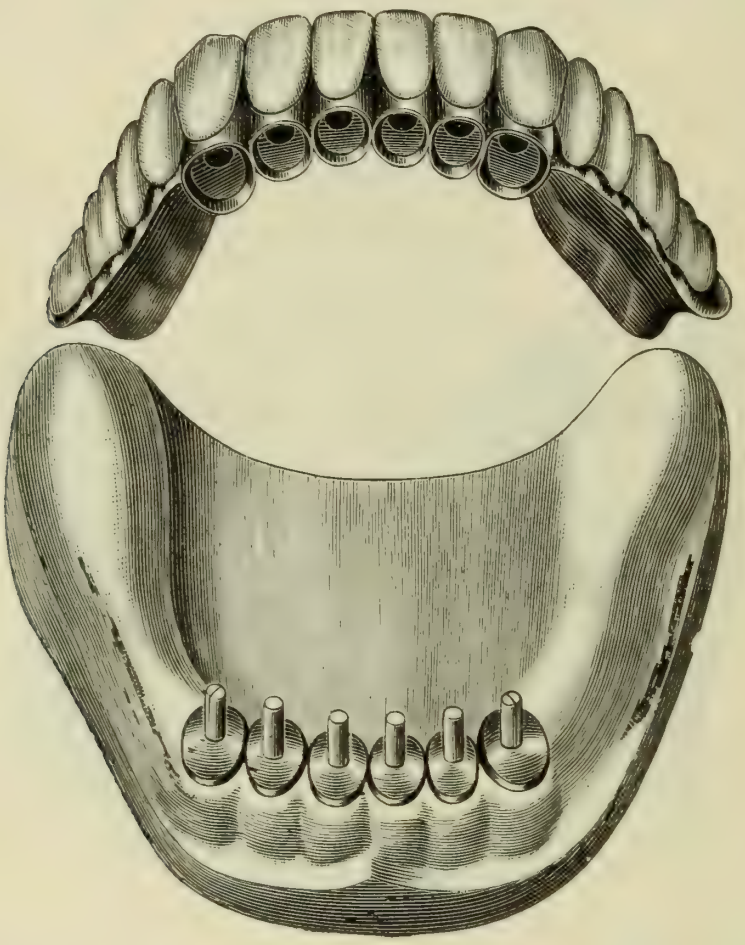
For the conception of this work I am indebted to Dr. Büttner, a friend of mine, through whom I saw a similar piece of work.

Case No. 2 illustrates a piece of bridge-work in which the front teeth were bent inside in such a manner as to render the cementing impossible with success. The patient of this case possessed both second molars, the cuspids and first bicuspid. The two bicuspids and left cuspid were found to be clear, but treated and fitted a number of years before the patient came to me, and apparently in

good condition; I extracted the pulp of each cuspid and filled the root-canals.

The crowns of the four front teeth were now cut off, and each root was capped, with a pivot extending into the root. On the top of each I soldered a gold-iridium pivot on which I made a thread. Then I swaged a platinum cap over the others, then made a platinum cylinder, which fitted loosely over the pivot, took the back facing, waxed it to the cap and cylinder, invested it in plaster of Paris, and soldered it. Before investing I put a heavy lead point into the cylinder to prevent the solder from flowing inside. The

FIG. 3.



caps were now cemented to the other roots, the other crowns were put in position, an impression was taken, and the work was finished in the usual way. After the work was cemented little nuts were screwed to the thread which extended from the cap, and the space of each cavity was fitted with gold, which completed the work.

Case No. 3 represents a combination of a removable bridge-plate. The patient possessed the six front teeth, and, since there were no posterior teeth, they were ground down almost to the gum. The pulps of the cuspids and lateral incisors were dead; mastication was also rendered difficult on the three others, because the pulps were nearly exposed.

The roots were very strong; I therefore concluded to treat and fill them in order to use them as supports for what is to be called removable bridge-plate. To begin with, I prepared a cap with a

pivot over each root. On the top of each cap I soldered a gold-iridium pivot. In adjusting the pivots to the caps I took extreme care to have them exactly perpendicular, as this is very important for the removal of the work. I then swaged the gold caps over the others, made a platinum cylinder, with one side closed, which fitted exactly over the pivots, then I took the porcelain facing, which was backed with gold, fastened with hard wax to the cap and cylinder, invested it and soldered the parts together. The two cuspids I then set into position, took an impression from each side of the lower jaw, formed from this a zinc model and swaged upon it a gold plate.

The posterior teeth were ground according to the articulation of upper teeth, then backed and soldered to the saddle. Great care was taken to receive a very accurate impression of the whole work. The six front teeth were first soldered together and set over the roots. The side saddles were held down firmly with two instruments by myself while my assistant took the impression. From this another impression was taken, invested, soldered, and finished, which completed the work.

(To be continued.)

American Medical Association—Section on Dental and Oral Surgery.

The fiftieth annual session of the American Medical Association, the largest and most important meeting in the history of the association, was held in Philadelphia, June 1-4, 1897.

The Section on Dental and Oral Surgery held its sessions in the Hotel Walton, Dr. R. R. Andrews, of Cambridge, Mass., presiding.

Dr. Andrews said in part,—

It is the usual duty of the Chairman of Sections of this association to give, in an annual address, a review of all matters new and important that have a special interest touching the scientific character of the work of the section to which he may belong. It has been thought best to some extent to modify the nature of the subject on this, the occasion of the Golden Anniversary of the American Medical Association, and to give in place a brief history of the work of the section in the past. The history of our section is one of which we may well be proud. The work has been in the main along the line of higher themes of scientific research, and we may rest assured that by comparison with the programs of similar organizations, the work of this section does not suffer.

In the year 1880, the men who largely represented the brain and sinew of our profession, believing that dental surgery then held a position beneath that to which it was entitled, and believing that such a condition should be remedied, felt it their duty to devote a portion of their time and energies to bring about a change for the better. These men earnestly believed that dentistry was a specialty of the healing art, and as such it should have representation in the sessions of the national medical organization. They

were actuated by no narrow views. Their sole purpose was the upbuilding of their profession. Presenting themselves at the meeting of the American Medical Association held at Richmond, Va., in 1881, as delegates from local medical societies, they proposed the organization in the association of a separate section on Oral and Dental Surgery. These delegates were Drs. W. W. Allport, T. W. Brophy, and Eugene S. Talbot, of Chicago; Dr. J. L. Williams, of Boston; Dr. G. L. Goodwillie, of New York; Dr. Hawxhurst, of Grand Rapids, Mich., and Dr. G. L. Parmele, of Hartford, Conn., all practitioners of dentistry holding a medical degree. Each gentleman constituted himself a committee of one to champion the movement among the members of the association who were in attendance. They found no opposition whatever. On the contrary, the oldest members, and especially the ex-president of the association, were heartily in sympathy with the movement and anxious to assist in bringing it about. At the morning session on Thursday, May 5, Dr. Samuel D. Gross, of this city, addressing the association, asked for a suspension of the regular order of business. This motion was granted. He then moved that the by-laws of the association be so amended as to create another section, to be known as Section VII, entitled "Dentistry." The motion was favored by Dr. Sayre, of New York, and Dr. N. S. Davis, of Chicago, and was adopted. The object of suspending the rules at this time was for the purpose of creating the section, that it might begin work at that session, the members who were to constitute the section being prepared with papers for that purpose. Dr. Toner, of Washington, objected, saying that he was not opposed to the section organizing and commencing work this year, but he did not wish to make a precedent for future sections. It was therefore decided that it could not go into operation until next year, when, according to the constitution and by-laws of the association, dentistry was officially recognized by the American Medical Association.

The Dental Section has met with the association every year since its formation. The quality of the papers presented, from a scientific standpoint, has been of the highest order. Our place is now here, where it seems to me it ought to be, among the specialists of the great guild of physicians, a part of the body of scientific men whose life-work is the amelioration of human suffering.

In the annual address delivered before this section at its last meeting I gave the result of my investigation of the development and structure of the dental enamel, and in a friendly way criticised some of the views of another writer who had recently written on the same subject.

I have given considerable time to the further investigation of this subject, preparing a paper, which I read before the Institute of Stomatology of New York in February last. This paper was discussed by some of the more eminent biologists of that city, who agreed substantially with me in every point presented to you at our last meeting. The only important point on this subject I have to present as new matter is the fact, unnoticed before, that

some of the globular bodies that have been deposited by the ameloblasts to form the enamel-rods are not homogeneous masses of substance, but are globules having within their substance aggregations of minute spheres (calcospherites), which, for some reason, have not coalesced into a mass. These minute globular bodies are held together by what appears to be an envelope or membrane, the whole forming a globule of the same size of what I may call the normal enamel-globule at its point of calcification. In some of my sections I have found these enamel-globules containing the minute spheres, covering quite an area of forming enamel, and they are shown in this condition as they are drawn down into the calcifying rod. They are more than likely calcified in this condition. It would appear as though it were a fault of structure, perhaps some arrest in the developmental process. Of this, of course, I cannot be positive, but the appearance would seem to account for the minute globular structure seen within the rods of the calcified enamel, as shown in some of Dr. Williams's illustrations of calcified enamel.

A very valuable contribution to the study of the pathology of the enamel, by Dr. J. Leon Williams, of London, has recently appeared in the pages of the DENTAL COSMOS. While the subject matter of the text is not altogether new to those familiar with this line of investigation, the lucid way in which the subject is presented and the very thorough descriptions of the minute pathological conditions of the tissues involved, together with the great beauty of the large number of illustrations, make it the most notable contribution to the literature of this subject that has yet been presented to the dental profession. He has given a large mass of evidence, and the labor must have been enormous. Being familiar with the extreme difficulty of preparing sections of enamel for photo-micrography, and knowing something of the time required, I can fully appreciate the great work Dr. Williams has accomplished. This series of papers follows along the line of investigation given in one I read before this section in the year 1890, on "A Study in Dental Pathology, including Pits and Fissures of the Enamel," but is much more complete. I can heartily agree with Dr. Williams in the conclusions advanced, and trust we may have this work published by itself in a more permanent form, for reference and for the use of students in our educational institutions.

The year that has passed has pretty conclusively proven that the dental use of cataphoresis may no longer be considered as in its experimental stage, in so far as its investigation relates to the obtunding of extremely sensitive dentin and its value in bleaching badly discolored teeth. There are a few who are yet doubtful about its future effect upon the life and health of the dental pulp, but the large majority of cases reported have been remarkably successful, and attest to its undoubted value. The method has also been found to be certain in its action in fully obtunding exposed pulps prior to their removal. Investigations are being made by this method which promise success in the treatment for the relief and cure of chronic cases of pericementitis by a perfect sys-

tem of sterilizing root-canals at the time of filling. It has been found that almost any good kind of antiseptic can be used; oil of cassia, hydrogen dioxid, zinc chlorid, and silver nitrate have all been tried with success, the method of using being something like that used for obtunding sensitive dentin. This treatment is said to allay the pain in a short time, and to place the tooth at once in a condition for immediate root-filling. The results obtained by using silver nitrate are significant. Sections made from teeth which had been treated by a solution of silver nitrate by Dr. Bethel, of Kent, Ohio, were sent to me for microscopical examination. The higher powers of the microscope revealed the fact that the silver nitrate had been forced by the current a very considerable distance into the dentinal tubuli, and each had been completely sealed up by it. As the dentin of the root is almost always infected by a putrescent pulp, which sends its organisms into the canals of the root, we can clearly see the importance of this perfect method of sterilization. In the treatment of pyorrhea, the cataphoric method of medication has been found to be a valuable acquisition, and in some cases it has been claimed to have been used with considerable success in facial neuralgia.

The very considerable value of the application of the X ray as an assistance in diagnosis in our specialty has been repeatedly demonstrated during the year that has passed. It is now possible to make skiagraphs, or shadow pictures, of any part of the mouth or jaws, showing the teeth in proper relation with their alveolar sockets. The roots of the teeth, being denser than the bone which surrounds them, show clearly throughout their whole length, and we are thus enabled to note any peculiarity that may exist. In Boston there is one of our profession who has made a special study of this work. He has succeeded in making some very remarkable demonstrations. Many of his pictures are of unerupted teeth deep within the tissues of the jaw. It is possible to show fragments of roots that are the source of obscure troubles. One picture shows a broken pulp-canal drill just beyond the apex of the roots that for months had been the cause of a most troublesome abscess. The broken drill was thus found and removed, resulting in a perfect cure. It is yet doubtful if we shall be able to determine diseases of the tooth-pulp by the X ray, but authorities assure us that by it it is possible to diagnose necrosis, tuberculosis, and exostosis. They claim that diseased conditions cast a shadow differing from normal tissue, and thus the disease is readily demonstrated.

The question regarding an endowment for dental research has recently been brought to our attention by a letter to the DENTAL COSMOS from Dr. C. E. Kells, Jr. He believes that an incalculable amount of good would result to our profession from such compensation for original investigation. The importance of the matter presents itself to us at this time largely on account of the recent magnificent work of Dr. Black and Dr. Williams, and it is earnestly hoped that a fund sufficient to continue these investigations may be appropriated by individuals and societies, that this important work may continue. To quote in part an editorial from the April

Cosmos: "Nature reveals her hidden secrets to those only who have learned how to question her and who are able to interpret her answers; she demands of her devotees absolute fidelity, uncompromising honesty, unflinching accuracy, absolute self-abnegation, and never-flagging enthusiasm in her cause. To meet these conditions requires the expenditure of much time and energy, and just in so far as the time of the investigator is occupied with matters foreign to his calling will his results be curtailed. It would be well to utilize his abilities for the general good by placing him beyond the demands which the necessity for maintenance imposes, thus securing for all those advantages which the entire devotion of his abilities to scientific research would entail."

This matter is a subject that merits our earnest consideration.

Within the past year there has been a movement on the part of some of the dentists of the city of Baltimore to bring about the enaction of a law that shall require the examination of the condition of the mouths and teeth of the children of the public schools. The importance of this movement may not at first thought seem to be serious, as it really is, but if we consider it carefully it will be found grave enough to enlist our most careful consideration, fraught as it is with serious consequences both to the present and future, and a law of this kind should be enforced in every city in our country. The time of life that the school years cover is very important to the child from a dental standpoint. If the teeth are cared for during this period, the chances favor their permanent retention, and for this reason, if for no other, this movement should be urged and encouraged by every intelligent dentist.

The connection between bacterial growths in the oral cavity and severe disturbance of the general health is to-day well known. There are those who carry more filth in their mouths than they would tolerate on their skins. And this is the condition of the mouths of many of our school-children. There are those whose teeth receive very little, if any, care. On inspection they will be found to be covered with a thick deposit in an active state of fermentation. In these mouths we shall find the gums inflamed, suppurating and decayed roots with chronic abscesses continually discharging their putrefactive products into the mouth. The fact that such mouths may be the source of disease and even death has been very much underrated. It is known that pulmonary diseases are brought about by the inspiration of germs from the oral cavity. The mouth is a veritable breeding-place for the infection of the digestive apparatus; Professor W. D. Miller, of Berlin, estimating, by experimentation with cultures, the number of cultivable bacteria in a very unclean mouth at over a billion. Many of these, he thought, were carried to the stomach at every meal, to be replaced by others developing between meals and over night.

I doubt if there is a better culture-medium to be found for the growth and multiplication of the pathogenic bacteria than the exposed decaying dentin of the human teeth, after the enamel has been destroyed and the dentin decalcified. In it we have a substance perhaps more favorable for the growth and development of

these organisms than any other tissue. This in itself is a very significant fact which we should not lose sight of, while considering this subject. There should be special care on the part of those who from necessity are brought into close contact with persons suffering from contagious diseases. Many children in our public schools inherit a tendency favoring a development of these troubles. In our crowded, hot, and insufficiently ventilated school-rooms the inhalation of micro-organisms and the cultivation of these organisms in decaying dentin may be, and probably is, the cause of disease and death.

Of all the ills that man is heir to, the most appalling in its dire results is tuberculosis. To-day it is known to be communicated by infection alone, the infecting agent being the bacillus of the disease. It blights all who come within its grasp, sapping the life-blood and making the life a wreck, followed by misery and death. The children of the poor, especially the immature and sickly, are most susceptible to this disease. In a paper recently published in the *Journal of the American Medical Association* on "Tuberculosis Infection from Food," the author, Dr. Charles E. Winslow, tells us that there is an increasing anxiety among medical thinking men due to the resistance of tuberculosis to the advanced curative remedies. All come far short in checking this most formidable of all diseases. The most advanced investigators believe that the colonization of Koch's bacillus in the animal tissue is the cause of the disease. If this be true—and there can be little doubt of it—it gives ground upon which we can work out our own salvation by controlling the spread of the disease. Our children are fed largely on milk, and the most common disease of the cow from which the milk comes is tuberculosis. Very little milk reaches our city free from a mixture with milk from tuberculous animals. The close relation that exists between the cow and the human family renders it possible for the spread of this frightful malady, and for the child's best friend to become his worst enemy.

In an article on carious teeth and tuberculous cervical glands, Stark, in the *Revue de la Tuberculese*, July, 1896, notes the frequent association between carious teeth and enlargement of the cervical lymph-glands. He examined one hundred and thirteen children with enlargement of the cervical lymph-glands, and found that one per cent. had carious teeth. Not being able to find any other apparent cause for the condition, he concluded that the swollen glands resulted from the defective teeth in a series of cases. They correspond in situation, in time of development, and in the degree of enlargement with the condition of the teeth.

The involved glands were situated on the same side as the diseased teeth, the anterior glands being enlarged if the incisors were carious, and those at the angle of the jaw when the molars were involved. Toothache frequently preceded the enlargement of the glands. Stark is of the opinion that the enlarged glands are tuberculous in quite a number of these cases. He reports two cases in which he was able to demonstrate pretty conclusively that the carious teeth had been the point of entrance of the tubercle bacilli.

One, a boy aged eighteen years, who had always been healthy and without a family history of tuberculosis, had caries of the molar teeth on both sides, with enlargement of the cervical glands. The glands were excised and the teeth extracted. The former proved to be tuberculous on examination, and tubercle bacilli were found on cover-slip preparations from two of the decayed teeth.

The second was a girl of fourteen years, with excellent personal history and without a history of tuberculosis in the family. The lower first molar tooth on the left side was carious, and there was an enlarged gland below the ramus of the jaw. The gland was removed, and showed definite tuberculous disease. Between the diseased molar and the adjacent tooth, and also forming the floor of the cavity in the tooth, were characteristic tuberculous nodules with typical giant-cells. This latter case is especially interesting, as it seems to show that a carious tooth may be the seat of a primary tuberculous focus.

With regard to treatment, the glands should at once be removed, and the carious teeth should be either properly filled or extracted. As a prophylactic, the teeth should be better cared for, and Stark advocates with Rose the placing of all small school-children under supervision.

An interesting case has just been reported to me by a brother dentist. A boy of about sixteen years, who was an invalid, a patient of his, whose teeth were so extremely sensitive that he could not, or would not, have them filled when they were decayed, had trouble with his cervical glands and had them operated upon, with relief for a number of years. Afterward it was found that other glands were infected with tuberculous disease, and the patient was taken to New York for treatment. The surgeon who performed the operation of excising the infected glands insisted that all of the decayed teeth in his mouth should be at once removed, giving as his reason that the decayed teeth were largely the cause of his infection.

Another case was reported to me in Cambridge of an immature child who, having trouble with the cervical glands, had them operated upon by a local surgeon. Some little time afterward symptoms of tuberculosis set in, and the surgeon who performed the second operation thought it might be probable that this terrible infection was brought about by the organisms of this disease, which were cultured in the decaying dentin of the molar teeth.

The importance of dealing with this subject must commend itself to us. In many of our states there are commissions, whose duty it is to make examination of cattle suspected of having this disease, and large amounts of money are annually expended. The cattle which are found infected are destroyed. Does it seem less reasonable that we should try to prevent our school-children becoming infected? It is a matter that should come home to every man of family, who would surely desire such supervision after understanding the importance of the subject, if by any possibility it would shield their children from this terrible infection. For this

reason they should support a law directing such examinations to be made in our public schools.

The important question we have to consider is: How are these examinations to be brought about? One correspondent states: "If your Board of School Commissioners is the same as ours, a request of this nature would be looked upon as an unwarrantable piece of interference,—a bid to obtain practice." This same writer, however, acknowledges the true charity and philanthropy of the movement. Another states: "If the dental societies are sufficiently in earnest and sufficiently united to pledge themselves to furnish competent members of their bodies at regular periods of each year, a committee from those societies could petition the Board of Education to appoint an examining dentist to each school." This suggestion, it seems to me, is a most excellent one. Our profession should do more in the way of public charity than it does. We do very little compared to the gratuitous services rendered by the medical profession. The first move should be through the State Board of Education, by the state dental organization. All school-children under the care of the family dentist should be required to present to the masters of each school a certificate signed by their dentist. This should be considered sufficient evidence of the healthy condition of the child's mouth. All other children should pass the required examination. An expert could make an examination of each scholar in from three to five minutes. In most of the large cities there are one or more dental colleges, with infirmaries for the treatment of all such cases. In these cities the children of the poorer classes should be sent for proper treatment. In cities where there are no colleges, dentists can be appointed by the dental societies to attend to this charity work.

The Boards of School Commissioners in the various states are men of culture and liberal education. They cannot fail to see the necessity for such dental supervision, if the matter is presented to them in the proper manner. It will be apparent that such examinations are for the real interest of the children, and an act of real charity and philanthropy, guarding the common welfare and safety of those under their care.

The matter is of such vital importance that we should seek the co-operation of every dental organization in this country to aid us in our efforts to bring about the examinations and treatment of the mouths of the children in our public schools. Who better than they can recognize the justice and importance of this matter? It will save the children from sorrow and suffering, and in many cases such supervision will triumph over disease and death.

(To be continued.)

Woman's Dental Association of the United States.

The fifth annual meeting of the Woman's Dental Association of the United States was held at the office of Dr. Mary H. Stillwell, 1718 Walnut street, Philadelphia, March 6, 1897.

The following officers were elected for the ensuing year: Dr. E. Davis, president; Dr. M. B. Rauch, vice-president; Dr. Frances G. Crouch, recording secretary; Dr. A. T. Focht, corresponding secretary; Dr. E. M. Wyeth, treasurer.

Drs. Mary H. Stillwell, Martha A. Corkill, Maria Lassar, Hannah Miller, and Eliza T. Yerkes, executive committee.

The vice-presidents from representative states are Dr. Sara May Townsend, of Colorado; Edith Jewel, of Washington, D. C.; Hester Baker, of Illinois; Mary Gallop, of Massachusetts; Fannie C. Hoops, of Maryland; Mary Weston, Missouri; Alice Ireland, of New York; Cora G. Little, of Nebraska; Sarah Gardiner, of Wyoming, and Jennie H. Gallop, of Rhode Island.

The membership numbers thirty-four.

The June clinic was held at Dr. Davis's office, on Walnut street. Demonstration on filling with soft gold by Dr. Davis. Meeting adjourned until fall.

FRANCES G. CROUCH, *Rec. Sec.*,
302 S. Tenth st., Philadelphia.

ILLINOIS STATE DENTAL SOCIETY.

THE thirty-third annual meeting of the Illinois State Dental Society was held at Peoria, May 11 to 14, 1897. The following officers were elected: J. A. W. Davis, Galesburg, president; W. A. Johnston, Peoria, vice-president; A. H. Peck, Chicago, secretary; E. D. Swain, Chicago, treasurer; Grafton Munroe, Springfield, librarian. The next meeting will be held in Springfield, May 10, 1898.

A. H. PECK, *Secretary.*

EIGHTH DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE twenty-ninth annual meeting of the above society was held in Buffalo, N. Y., on the 27th and 28th of April, 1897. The following were elected officers for the ensuing year: S. Eschelman, president; Louis Meisburger, vice-president; W. E. Marshall, recording secretary; D. F. Bentley, corresponding secretary; C. W. Stainton, treasurer; S. A. Freeman, librarian.

W. E. MARSHALL, *Rec. Sec.*,
341 Pennsylvania st., Buffalo, N. Y.

WASHINGTON STATE DENTAL SOCIETY.

THE tenth annual meeting of the Washington State Dental Society was held at the Hotel Butler, Seattle, May 17, 18, and 19, 1897, and officers for the ensuing year were elected as follows: R. B. Gentle, president, Seattle; H. L. Hedger, first vice-president, Tacoma; J. N. Prather, second vice-president, Seattle; C. L. Erwin, secretary, Seattle; J. W. Cloes, treasurer, Tacoma.

R. B. GENTLE, *President.*

Massachusetts Dental Society.

Following are the officers of this society for 1897-98: Sidney S. Stowell, Pittsfield, president; Harry S. Draper, Boston, first vice-president; George A. Lowe, Rockport, second vice-president; Edgar O. Kinsman, Cambridge, secretary; Joseph T. Paul, Boston, treasurer; Thomas W. Clements, Brookline, librarian; Henry L. Upham, Boston, editor.

Edgar O. Kinsman, *Secretary,*
Cambridge, Mass.

Georgia State Dental Society.

The twenty-ninth annual session of the Georgia State Dental Society, which was held at Warm Springs, June 8, was the largest and most interesting in the history of the society.

The officers elected for the ensuing year are as follows: President, H. D. Wilson, Bainbridge; first vice-president, M. N. Mixon, Rome; second vice-president, B. H. Williams, Waycross; treasurer, H. A. Lowrance, Athens; recording secretary, S. H. McKee, Americus; corresponding secretary, O. H. McDonald, Atlanta. Executive Committee, W. W. Hill (chairman), Washington; E. L. Hanes, Griffin; B. F. Sims, Cedartown; W. A. Summerlin, Mt. Vernon; C. P. Davis, Americus. Examining Board, J. H. Coyle (chairman), Thomasville; D. D. Atkinson (secretary), Brunswick; A. G. Bouton, Savannah; H. H. Johnson, Macon; B. H. Catching, Atlanta.

Next place of meeting, St. Simon's Island, Ga., on the second Tuesday in June, 1898.

Otis H. McDonald, *Cor. Sec.*

Illinois State Board of Dental Examiners.

The members of the State Board recently appointed by the Governor met at Springfield, on Friday, June 11, 1897, for the purpose of organization.

Dr. W. C. Jocelyn, of Cairo, was elected president, and Dr. J. H. Smyser, of Chicago, secretary.

The next regular meeting will be held in September at Springfield.

J. H. Smyser, *Secretary,*
Suite 400, 70 State St., Chicago.

New England Association of Dental Examiners.

On the evening of March 4, 1897, the members of the various examining boards of New England dined at the University Club in Boston, by invitation of the Massachusetts board. At this dinner and at a conference after it sixteen were present, representing Maine, Vermont, Massachusetts, Rhode Island, and Connecticut. It was the unanimous vote of those present that a permanent

organization be effected to promote the following objects: To secure, through the co-operation of the various examining boards of New England, a high and uniform standard of qualifications for dental practitioners, and, so far as possible, uniformity of legislation as well as uniformity in the requirements of candidates. A committee, consisting of Dr. John F. Dowsley, Dr. George L. Parmele, Dr. D. F. Keefe, and Dr. T. J. Barrett, was appointed to frame a constitution and to call a meeting for organization.

This meeting called together at Boston, June 3, representatives from all the New England States except New Hampshire. The constitution presented by the committee was, after some minor changes, adopted, and the following officers were elected: John F. Dowsley, D.D.S., of Boston, president; D. F. Keefe, D.D.S., of Providence, R. I., vice-president; George L. Parmele, M.D., D.M.D., of Hartford, Conn., recorder. The time and place of next meeting was left to the officers.

DENTAL COLLEGE COMMENCEMENTS.

New York Dental School.

The fourth annual commencement exercises of the New York Dental School were held at the Academy of Medicine, New York, on Wednesday, May 26, 1897, at 8 o'clock P.M.

The address to the graduating class was delivered by Rev. James A. Francis.

The degree of D.D.S. was conferred on the following graduates by Professor Dwight L. Hubbard, dean:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
James L. Gay	New York.	August F. Paulsen	New York.
Charles I. Ferris	Connecticut.	John E. Donavan	Vermont.
J. T. T. Clark	Jamaica, W. I.	William Groll	New York.
Edward P. Whitney	Connecticut.	August C. Wintraecken	New York.
Georgius H. Franzius	New York.	Frederick A. Crookshank	New York.

Pittsburg Dental College, Department of Western University of Pennsylvania.

Commencement exercises of this institution were held March 25, 1897, in the Alvin Theater, Pittsburg, Pa.

The address to the class was delivered by the Rev. J. C. White, D.D., secretary of the board of trustees of the university.

The number of matriculates for the session was one hundred and nineteen.

The degree of D.D.S. was conferred by Chancellor Holland upon the following graduates: Adolph T. Bowers, Pennsylvania; George L. McFarland, Pennsylvania; Henry H. Redmond, Pennsylvania; John H. Sloan, Ohio; Nevin H. Snyder, Pennsylvania.

Boston Dental College.

The thirtieth annual commencement exercises of the Boston Dental College were held in the Berkeley Temple, Boston, Mass., on Wednesday evening, June 16, 1897.

The annual address was delivered by Rev. Stephen N. Roblin, and the valedictory by Seth B. Hilborn, D.D.S.

The degree of D.D.S. was conferred on the following graduates by I. J. Wetherbee, D.D.S., president of the college:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
George H. Akins	Massachusetts.	Calvin N. Lassonde	Vermont.
Harry J. Baker	New Hampshire.	Benjamin Lewis	Vermont.
Daniel J. Barnicle	Massachusetts.	Jos. E. Livingston	Vermont.
Alston F. Barrett	New Hampshire.	Sverker Luttropp	Vermont.
Joseph A. Barrett	Massachusetts.	Geo. E. Maguire	Vermont.
Daniel W. Bradt	Massachusetts.	Joseph Massell	Vermont.
Herbert R. Brunton	Massachusetts.	E. M. Montgomery	New Brunswick.
John F. Caulfield	Massachusetts.	Joanna R. Nahrung	Massachusetts.
Marie H. F. Caron	Massachusetts.	Wm. B. Osgood	Massachusetts.
William A. Cleary	Massachusetts.	Joseph H. Peront	Massachusetts.
Neal F. Clifford	Massachusetts.	Percival Phillips	Massachusetts.
Edw'd E. Copeland	Massachusetts.	Robert A. Pierce	Massachusetts.
John S. Cunard	Massachusetts.	John P. Rattigan	Massachusetts.
John Denby	Rhode Island.	Russell A. Richards	Massachusetts.
James B. Duffy	New Hampshire.	Henry S. Robinson	Rhode Island.
Edward M. Ennis	New Hampshire.	James A. Scanlan	Rhode Island.
Raym'd M. Gaylord	Massachusetts.	Jacob Schwartz	Rhode Island.
Thomas H. Gifford	New Hampshire.	Isaac H. Small	Rhode Island.
Andrew F. Hall	Massachusetts.	Fred'k B. Stevens	Rhode Island.
Seth B. Hilborn	Maine.	Emil Strohn	Rhode Island.
James D. Hogan	Nova Scotia.	Samuel H. Sweatt	Rhode Island.
Fred'k A. Holden	Massachusetts.	W. C. Thompson	Rhode Island.
Hiland F. Holt	New Hampshire.	Stanley Towle	New Hampshire.
Sara P. Hooker	Massachusetts.	Jerome P. Tripp	New Hampshire.
Anthony V. Hoppe	Massachusetts.	Arie L. Tschernia-tovski	Russia.
John F. Howland	Massachusetts.	Arthur F. Weaver	Massachusetts.
Ervin A. Johnson	Vermont.	Truman R. Wilbur	Massachusetts.
Orion Kelley	Vermont.	Lewis W. Wilson	Massachusetts.
William J. Kelly	Vermont.		

National University—Dental Department.

The thirteenth annual commencement exercises of the Dental Department of the National University were held, in connection with those of the Medical Department, in the National Theater, Washington, D. C., on Thursday evening, June 10, 1897.

The address to the graduating classes was delivered by Professor J. Roland Walton, D.D.S., and the valedictory address by Howard P. Cobey, D.D.S., M.D.

The degree of D.D.S. was conferred on the following graduates of the dental class:

NAME.	STATE.	NAME.	STATE.
James J. Brennan	Pennsylvania.	J. Clarence Hatton	New Jersey.
Robert E. Buchanan	Virginia.	Millard J. Holmes	New York.
Tyrus Christman	Pennsylvania.	William W. Trail	West Virginia.
Howard P. Cobey	Mary'and.	Edward B. Wall	Illinois.
William T. Heyser	Maryland.		

UNIVERSITY OF PENNSYLVANIA—DEPARTMENT OF DENTISTRY.

THE annual commencement exercises of the University of Pennsylvania were held in the American Academy of Music, Philadelphia, Pa., on Wednesday, June 9, 1897, at 11 o'clock A.M.

The degree of Doctor of Dental Surgery was conferred by Charles C. Harrison, A.M., LL.D., provost, upon the following candidates:

NAME.	STATE OR COUNTRY.
Thomas J. Allen	Pennsylvania.
William A. Allwood	Jamaica.
Chas. H. Archibald	Canada.
George R. Beecher	New York.
Hesper Beecher	Georgia.
Edward W. Bohn	Pennsylvania.
Glenni F. Bowman	Pennsylvania.
Charles E. Burt	Ohio.
James H. Callahan	Connecticut.
Lester L. Carlisle	Delaware.
George C. Case	Connecticut.
Ellis J. Chesbro	New York.
Martin P. Congdon	New York.
Wirt H. Conklin	Pennsylvania.
William M. Copley	New York.
Francis Correa, Jr.	Pennsylvania
Charles M. Crowell	Pennsylvania.
Frank H. Darragh	Pennsylvania.
John B. Dickinson	Arkansas.
George W. Dickson	Canada.
Robert A. Dickson	Scotland.
Arthur G. Doane	Massachusetts.
John J. Dolan	Massachusetts.
George B. Edwards	Pennsylvania.
Archibald C. Eglin	Pennsylvania.
Ernest J. Eisen	Wisconsin.
Wm. L. Ellerbeck	Utah.
Thomas A. Eynon	Pennsylvania.
Frasier M. Failing	New York.
George A. Flexer	Pennsylvania.
Charles F. P. Groth	Pennsylvania.
Hedley H. Ham	Australia.
Robert D. Hand	New Jersey.
Frederick W. Haselo	New York.
Thomas A. Herr	Massachusetts.
Otto E. T. von der Heyde	Turkey.
Isaac J. Hill	Russia.
William C. Hoeffer	Pennsylvania.
Powell A. Holloway	Pennsylvania.
Lionel M. Homburger	New York.
Joseph Huggins	Washington.
William J. Ingraham	New York.
Mack R Jackson	Delaware.
Leon S. Joffe	Pennsylvania.
Roy R. Johnston	Pennsylvania.
David E. Kerr	Ohio.
Frank S. Ketcham	New York.
Ad'n Kingsbury, A.B.	Ohio.
Harry F. Koontz	Ohio.
Silas B. Langfitt	West Virginia.
Edward J. Laughlin	Pennsylvania.
Robert S. Levy	Germany.
Leonard Lockett	Jamaica.
Jaime D. de Losada	Spain.
William S. Louisson	Hawaiian I'ds.
Wm. H. Luffbarry, Jr.	Pennsylvania.
Irville O. Lyman	Pennsylvania.
George L. McAvoy	Connecticut.
Lee L. McDonald	Missouri.
John A. Mayer, Jr.	Pennsylvania.
Evan W. Mintzer	Pennsylvania.
Fried'h E. A. Müller	Germany.
Frank H. Murray	Minnesota.
Andrew S. Musser	Pennsylvania.
Alfred R. Neech	Germany.
James P. Nichol	Pennsylvania.
Henry C. O'Connor	Wisconsin.
Nelson T. Paine	New York.
George F. Patterson	Ohio.
Clarence A. Pennell	Iowa.
José Perez	Cuba.
Wm. J. Phymister	Canada.
Charles S. Preston	Illinois.
Ralph B. Reitz, A.B.	Pennsylvania.
Walter H. Richardson	Massachusetts.
Eugene F. Rinebold	Pennsylvania.
Charles J. Royce	Connecticut.
Otto C. H. Sawitzky	Germany.
Robert D. Sayre	Canada.
Paul B. Schultz	Pennsylvania.
Henry W. Shelp	Illinois.
Edward F. Smith	Pennsylvania.
Fred. E. Smith	Pennsylvania.
Aug. C. St. Amand	Pennsylvania.
Joseph B. Stannard	Missouri.
Adolph Stenner	Austria.
Ray'd A. E. Swentzell	Pennsylvania.
Will McL. Thompson	Pennsylvania.
Harry D. Urian	Pennsylvania.
Louis L. Voigt	Pennsylvania.
F'ncis W. Watlington	Bermuda.
James T. Watson	Pennsylvania.
Harry L. Welch	New Jersey.
Albert D'A. Wells	New York.
Herbert E. Williams	New Jersey.
Howard J. Williams	Pennsylvania.
Harry I. Wright	Pennsylvania.
Henry F. Zerfing	Pennsylvania.

DENTAL SOCIETY ANNOUNCEMENTS.

SOUTHERN DENTAL ASSOCIATION.

THE twenty-eighth annual meeting of the Southern Dental Association will be held at Old Point Comfort, Va., August 3 to 6, inclusive, 1897. Headquarters at the Hygeia Hotel.

An excellent program is being arranged. Members are urgently requested to be present.

This will be one of the most important meetings of the Southern, and it is hoped that every member of the association will be on hand, as the question of consolidation with the American will be settled at this time.

S. W. FOSTER, *Recording Secretary.*

CONNECTICUT STATE DENTAL ASSOCIATION.

AT a regular meeting of this association, held May 18, 1897, the following resolutions were unanimously adopted:

The Connecticut State Dental Association, viewing with deep regret the prevailing tendency on the part of several so-called dental journals to print advertisements of anesthetic nostrums and particularly the advertisements of "writers of dentists' advertisements:"

Resolved, That this association strongly condemns such conduct on the part of the editors of these magazines;

Resolved, That it would be well for the dental associations of this country to take such united action as would effectually stamp out this new phase of dental journalism.

CHARLES MCMANUS, *Chairman Exec. Com.*

NORTH CAROLINA STATE DENTAL SOCIETY.

AT the last annual meeting of the North Carolina State Dental Society the following were elected officers for the ensuing year: H. V. Horton, Winston, president; J. M. Ayer, Raleigh, first vice-president; C. A. Bland, Charlotte, second vice-president; C. W. Banner, Mount Airy, secretary; D. L. James, Greenville, treasurer.

The next meeting of the society will be held at Fayetteville, N. C., first Wednesday in May, 1898.

C. W. BANNER, *Secretary.*

WISCONSIN STATE DENTAL SOCIETY.

THE twenty-seventh annual meeting of the Wisconsin State Dental Society will be held in the Senate Chamber, Madison, Wis., July 20, 21, and 22, 1897. The Executive Committee is preparing an unusually interesting program, and a most cordial invitation is extended to all reputable practitioners in the state who are not already members to come, if possible, and unite with us.

W. H. CARSON, *Secretary,*
128 Wisconsin street, Milwaukee, Wis.

National Association of Dental Faculties.

The National Association of Dental Faculties will meet at Hygeia Hotel, Old Point Comfort, Va., on Friday, July 30, 1897, at 10 A.M.

The Executive Committee will meet at 9 A.M., Thursday, July 29. Persons having business with this committee will please present their papers at the first session. By order of

Jonathan Taft, *Chairman Exec. Com.*
B. Holly Smith, *Secretary.*

California State Board of Dental Examiners.

The California State Board of Dental Examiners consists of the following members: F. W. Bliss, president, Santa Cruz; F. F. Tebbets, Sacramento; F. H. Metcalf, Sacramento; Thomas Morffew, G. S. Backman, G. J. Drucker, San Francisco; W. A. Moore, secretary, Benicia.

The annual meeting for the examination of candidates for certificates to practice commences the first Tuesday in August, in San Francisco.

W. A. Moore, *Secretary.*

EDITORIAL.

The Argument for the Defense.

Under date of June 1, 1897, a "circular letter" was issued "To the Members of the Various State Boards of Dental Examiners" by the Committee on Colleges of the National Association of Dental Examiners, dealing exclusively with the editorial which appeared in the May issue of this journal. The "circular letter," if it is anything at all, is a rejoinder to the arraignment embodied in the editorial referred to and is an attempted justification of the position which, as it now appears, has been assumed by the National Association of Dental Examiners largely at the instance or suggestion of their Committee on Colleges. It is more than that if its evasion of the main issue and perversion of existing facts be taken into account, but its essential purpose is as stated. Through the courtesy of a member of one of the examining boards we received a copy of the "circular letter," and thereupon wrote to the chairman of the Committee on Colleges, asking if he had any objection to our publishing the rejoinder in order that both sides of the question might be presented to the profession at large, in the hope that in a multitude of counsels wisdom might have an opportunity to prevail. The privilege asked for was not given, on the ground that the committee had "no authority to give permission for the publication of matter which belongs exclusively to the National Association of Dental Examiners." The chairman further stated that "we are at present arranging for a conference

with a committee from the National Association of Dental Faculties for the purpose of adjusting any supposed misunderstandings," and that "they [the committee] have never deemed it best to present before the profession a subject which in its present stage should be confined to the members of the National Association of Dental Examiners and of the National Association of Dental Faculties."

As the chairman of the Committee on Colleges of the National Association of Dental Examiners expressed his "mild surprise" that under the circumstances we should desire to publish his circular letter, a reply to his communication was duly forwarded, the main features of which reply are as follows:

"PHILADELPHIA, June 15, 1897.

"DEAR SIR:

"In reply to your favor of 14th inst., permit me to say that my desire to publish the circular letter of your committee would not have caused you even a mild surprise had you realized that in the conduct of the DENTAL COSMOS principles are regarded as more important than personalities, and the interests of the dental profession greater than those of individuals.

"In direct reply to my inquiry as to whether you had any objections to my publishing the matter as stated, you inform me that you have no authority to grant such permission.

"As you have taken occasion to greatly exceed the limits of my inquiry by an expression of your personal opinions as to my motives and methods in calling attention to the public acts of your committee, you will doubtless grant me the privilege of expressing my own surprise that while you are apparently vested with all the authority necessary to issue a circular letter dealing exclusively with certain phases of the COSMOS editorial alluded to, yet you assert you have no authority to give it to the profession at large through the medium of a dental journal.

"Inasmuch as you are lacking the needed authority to publish your circular letter, let me renew for you the mild surprise by inviting you to prepare for publication in the DENTAL COSMOS an exhibit of the disinterested and consistent action of your committee with respect to the dental educational interests of this country which shall be essentially a rejoinder to the main contention of the May editorial, and which you have studiously evaded,—viz, that the National Association of Dental Examiners has assumed an extra-judicial function in concerning itself with the enforcement of educational methods, usurping the natural right of the National Association of Dental Faculties, and will ultimately destroy its large influence for good by failing to confine itself to its own legitimate business.

"I tender you this invitation not only because such a course is consistent with the policy of the journal with which I am connected, but for the further reason that I disagree with your view that the subject at issue is one which at any stage 'should be confined to the National Association of Dental Examiners and the National Association of Dental Faculties.'

"Those bodies are the creatures of the dental profession, and exist for the purpose of executing the will of the profession.

"If you conclude to accept the invitation here given I must have copy by Thursday, in order to secure for it a place in July COSMOS, where I propose to further discuss the subject at issue.

"Yours truly,

"EDWARD C. KIRK.

"Dr. L. ASHLEY FAUGHT, *Chairman Committee on Colleges,*
"National Association of Dental Examiners."

We regret that the lack of authority referred to has deprived the profession at large of the entertainment which a study of the circular letter would have furnished. We further regret that we are as yet without copy for the rejoinder which we have invited, but for that we shall continue to hope.

There are a number of features in the "circular letter" which should not be confined to the limited circle for which, it is stated, they were written, for example the following: "It is to be understood that notwithstanding the use of it in the editorial in question, the word 'reputable' or reputability assigned to it by the editor is not used by the National Association of Dental Examiners. Its existence in any state law is not the work of the National Association of Dental Examiners. That body never tampered with or directly influenced any state law. Many states have found the necessity for such a word, and have of their own accord inserted it where it is found; and by separate resolution of many state boards it is interpreted to mean the list of recognized colleges of the National Association of Dental Examiners. The editorial is therefore in error in saying that the National Association of Dental Examiners sought 'mainly by attempting to legalize its stamp of reputability by incorporating in the state dental laws a clause,' etc. The editor reads backwards."

Well, let us see about this. At the annual meeting of the National Association of Dental Examiners, held at Saratoga Springs, August 3, 1896, Dr. Brown (Committee on Colleges) offered the following, which was carried:

"*Resolved,* That hereafter, all boards, members of this Association, accept the list of *reputable* colleges of the National Association of Dental Examiners as the official list of their respective states; and, further, that this association views with approval the efforts of the different state boards in their willingness to carry out the recommendation made by this association whereby a diploma from a *reputable* dental college was to be the only evidence of qualification to state examination; *and we urge the states having laws in conflict with this recommendation to renewed efforts for their amendment.*" (Italics ours.) From which we infer that the chairman of the Committee on Colleges doesn't read at all.

One other feature of this literary curio, the "circular letter," the brilliancy of which should not be hid under a bushel, is the following:

"It is a fair inference from the facts here presented that the cry of strained relations and the editorial attack do not contain the real issue, but that this false issue has been produced *by a few, very few men*, as a cloak to an issue far more important to the Faculties Association,—a disaffection on the part of some of the members of the *National Association of Dental Faculties*, caused by its adopting a high preliminary standard, which the *National Association of Dental Examiners*, perhaps unexpectedly to the framers thereof, has signified its intention to see carried out." We have been much puzzled as to the exact intent of this assertion, which stands as a sort of rhetorical climax to the "circular letter," but after some consideration have concluded that it was meant to be diverting in character. If it was intended to divert the argument from the main issue it must be classed among the "springes to catch woodcocks," but in that it is a specimen of grim humor it is a success. We have looked in vain for any record upon the part of the Examiners of their intention to see the high preliminary standard of requirements proposed by the Faculties carried out, but no doubt the Committee on Colleges have attended to that, and in expectation of the Macedonian cry of the Faculties which must necessarily result from their inability to manage their own affairs the Committee on Colleges of the Examiners have in the true missionary spirit arranged to come over and help them. It would seem from the records that the business of the Examiners is arranged and done by its Committee on Colleges, and further that the work is first done by that committee and legitimized by the Association *ex post facto*, judging from the following clause in the report of the chairman of that committee: "Your Committee on Colleges, in looking up the official records to ascertain exactly what their powers and duties were, found no specifications whatever had been made; they would therefore suggest that the duties and powers of said committee be distinctly formulated."

Now that is the essential cause of the whole difficulty in a nutshell, and is distinctly the reason for the editorial in the May issue of this journal.

The Committee on Colleges has self-confessedly and of its own motion undertaken to do what is distinctly and exclusively within the function of the National Association of Dental Faculties to perform. It has concerned itself with what is not its legitimate business, either morally, legally, or by courtesy. It has done this

with no proper understanding of what should be done, and with no authority from its main body to do it. It has assumed the right to make laws governing educational methods, and to enforce its mandates through the channels of state legislation, and has exhibited a profound ignorance of the principles of common law upon which such legislation is based. It is therefore high time for the National Association of Dental Examiners to literally do what the chairman of their committee asks to have done, viz,—distinctly formulate the duties and powers of said committee. It is especially important that said definition be made in view of the proposed conference between committees from the Faculties and Examiners Associations. There has heretofore been too much discretion given to committees of both these bodies in the adjustment of matters which affect the interests of the whole profession. In the present case no action should be had finally until both associations have, as committees of the whole, defined the limitations which hedge the rights and powers of the parties in the premises. And first, last, and all the time let it be understood that there is no possible construction which can be placed upon existing constitutional law which will permit any state to delegate its legislative powers or give to any body of men the power to interfere with the rights of the states in the free exercise of their police power, one feature of which is the control of the educational function.

The State Board of Dental Examiners of California have not only grasped the idea clearly, but have adopted the only logical and legitimate course open to them by withdrawing from the National Association of Dental Examiners, because in the present attitude of that association their membership therein is "unlawful" (see p. 548 of this issue), and so it is of every other state board represented in the National Association, whose state law specifically defines the duties and powers of said state board of examiners.

It is evident, therefore, that if the National Association is to hold together as an organization, as it ought to, it will be compelled to readjust its methods in harmony with existing conditions, and especially with those legal principles which are fundamental to its range of usefulness. While, for reasons already given, we are unable to more than indicate the line of the argument thus far made for the defense, we sincerely hope that "in the calm excellence of their wisdom" the Committee on Colleges may by some efficient method which comports with their ideas of propriety enlighten the profession at large upon the vital issues with which

they are attempting to deal, and especially as to their understanding of their powers in the premises, which we believe the profession has the right to know.

Letter from Dr. Head.

We have received the following communication, to which we give place in this department:

To the Editor of the Dental Cosmos:

Sir,—In the June number of the Dental Cosmos appeared an article signed by Dr. C. N. Peirce. The resolution he publishes as having been passed by the society was offered by him, but was defeated in the discussion. The official facts of the case are these:

The Odontological Society of Pennsylvania held a special meeting November 10, 1896, for the purpose of hearing a report of a committee, previously appointed, to investigate the election irregularity said to have been perpetrated at the Pennsylvania State Dental Society, at its annual meeting held at Bellefonte last July.

The report as adopted by the Odontological Society would seem to clearly prove that an irregularity had been committed. According to the law of precedent of the Odontological Society, on request, I furnished reprints of the proceedings of that special meeting, which were unofficially circulated for the information of any member of the profession who might be interested.

Dr. Peirce, in addition to his mistake concerning the resolution, calls this a pamphlet "purporting" to be a report of the committee, and makes other similar statements calculated to cast doubt on its validity.

As the editor of the Odontological Society, I wish to state clearly that I prepared the reprint in question, that it is a true reprint from our proceedings, and that the statements therein of the committee are backed by documents.

The motion which was passed as a substitute for the one offered by Dr. Peirce, and which I seconded, was as follows:

"*Resolved*, That this association request the editor (Dr. Joseph Head) to publish in the Dental Cosmos and in the *International Dental Journal* a disclaimer of the responsibility of this association for the issuing of the reprints of the proceedings of its special meeting held on November 10, 1896."

Sincerely yours,

Joseph Head,

Editor of the Odontological Society of Pennsylvania.

Dr. E. Magitot.

We learn with deep regret of the death of Dr. E. Magitot, member of the Académie de Médicine and president of the Société de Stomatologie, Paris, France. An extended notice of this eminent savant will appear in our next issue.

BIBLIOGRAPHICAL.

GRAY'S ANATOMY, DESCRIPTIVE AND SURGICAL. A new American from the 13th English edition. 8vo, pp. 1249. 772 illustrations, many of which are new. Philadelphia, Lea Bros. & Co., 1897.

We noticed, some months ago, the extensive changes and improvements which had been made in the new edition of Gray's Anatomy, which maintain it in the position held by it now for nearly forty years,—that of the unrivaled single-volume treatise upon human anatomy in the English language.

We called attention at the time to certain defects and deficiencies which existed in those portions of the book dealing with the descriptive and surgical anatomy of the teeth and their embryology. The amount of space devoted to these subjects, which might appear limited if viewed from a purely dental standpoint, is, however, harmonious in point of size with the other sections of the work dealing with special regions. It is necessary, therefore, in treating of dental anatomy and embryology in this limited space, that it be done with the utmost regard for condensing much in small room. The task of making the necessary changes and alterations was placed in the hands of a dental writer, who has included about as much in the assigned space as it is possible to say.

Accurate drawings replace faulty ones. The chapter containing the only illustration representing correctly a typical human denture is the best of which we have knowledge in any text-book, excepting that of "Black's Dental Anatomy," which, however, does not give the same view. Condensation of treatment, while accomplished in such a manner as not to detract from strict accuracy of description, has afforded room for the introduction of a much-needed short section dealing with the arrangement of the teeth, wherein an epitome of the studies of Bonwill and of W. E. Walker has been introduced.

Every line of the section on the "Development of the Teeth" gives evidence of careful revision, and we note with satisfaction and congratulation that the studies of Dr. J. Leon Williams which appeared in the DENTAL COSMOS, 1896, have been adopted and briefly but clearly set forth. It may be truly said now that not only is this section on dental anatomy up to the times, but it is a little ahead of them.

The editor has overlooked in one place the use of the word

"fang" for "root." We call attention to this because of the evidence of careful expurgation of the word from all other places. He has let the phrase "permanent bicuspids" escape his eye in one place.

Several of the anatomical sections prepared by Professor M. H. Cryer have been used to replace comparatively crude and inaccurate cuts. The inclusion of dental writing in so standard a textbook as Gray should be a source of satisfaction to those interested in the growing status of dental studies in the world of science.

PERISCOPE.

A Professorship of Stomatology.—Some time ago we called attention to the influences exerted on the general health by the condition of the teeth, pointing out that modern dentistry had recognized much more injury than that which is local to the structures of the mouth. We need a word to include the whole subject of the diseases of the mouth. The term dentistry is so closely associated with the mere operative work, and comprehends so much that is more mechanical than clinical, that it will not serve as a descriptive term. "Stomatology," the science of the mouth, is the word that has found vogue of late, and Philadelphia now boasts an "Academy of Stomatology" composed of prominent dentists, and in active operation. Our present purpose is, however, not to discuss this society, but to point out that a scientific study of the histology and pathology of the teeth, both as to their local and general relations, deserves a place in regular medical schools on the same plane as the recognized specialties, and is perhaps more worthy than some of them. It has been said that the practice of medicine is confined to the sick, but that dentistry includes both sick and well.

A professorship of stomatology would, we believe, be a valuable addition to the regular medical curriculum. It would be quite unnecessary to include in this any instruction in the making of substitute structures or even the filling of teeth. These are important matters, but they are essentially mechanical, and they can be best left to those who have the gift of manual skill. Instruction in tooth extraction should be given. It is probably needed, for we recall having seen a very distinguished surgeon break a tooth in a clumsy attempt to extract it, and, moreover, seem to feel no shame at the failure. In the more closely-populated places, skill in extracting teeth comes but little in demand from the general practitioner, since in such places persons make a specialty of this work. The duties of a professor of stomatology would be to present a comprehensive course on the comparative anatomy, development and histology of the teeth, discuss the causes and varieties of tooth-diseases, their local and remote effects, exhibiting clinical cases illustrating these forms and point out the methods of treatment, carrying out so much of the latter as did not involve purely mechanical procedures. The incumbent of such a chair should be a dentist in actual practice, who should also be a graduate in medicine.

We look forward to the time when every person who aspires to be a member of the dental "profession" will be required to enter it through the doors of the medical college. Doubtless the establishment of professorships of stomatology in medical schools would hasten this reform, but this is not the main object for advocating the plan. We feel satisfied that much practical benefit will result if physicians are made aware by systematic instruction that the teeth are as much objects of medical treatment as the eyes, the uterus, or the stomach. It is possible the scope of the stomatologist might be broadened so as to include the entire digestive tract, but this is a matter of detail which probably can only be settled by actual trial.—*Philadelphia Polyclinic.*

Carious Teeth and Tuberculous Cervical Glands.—Starck (*Revue de la Tuberculose,* July, 1896) notes the frequent association between carious teeth and enlargement of the cervical lymph-glands. He examined one hundred and thirteen children with enlargement of the cervical lymph-glands, and found that one per cent. had carious teeth. Not being able to find any other apparent cause for the condition, he concluded that the swollen glands resulted from the defective teeth in this series of cases. They corresponded in situation, in time of development, and in the degree of enlargement with the condition of the teeth. The involved glands were situated on the same side as the diseased teeth, the anterior glands being enlarged if the incisors were carious, and those at the angle of the jaw when the molars were involved. Toothache frequently preceded the enlargement of the glands. Starck is of the opinion that the enlarged glands are tuberculous in quite a number of these cases. He reports two cases in which he was able to demonstrate pretty conclusively that the carious teeth had been the point of entrance of the tubercle bacilli. One, a boy, aged eighteen years, who had always been healthy and without a family history of tuberculosis, had caries of the molar teeth on both sides, with enlargement of the cervical glands. The glands were excised and the teeth extracted. The former proved to be tuberculous on examination, and tubercle bacilli were found in cover-slip preparations from two of the decayed teeth. The second was a girl, aged fourteen years, with excellent personal history and without a history of tuberculosis in the family. The first inferior molar on the left side was carious, and there was an enlarged gland below the ramus of the jaw. The gland was removed and showed definite tuberculous disease. Between the diseased molar and the adjacent tooth and also forming the floor of the cavity in the tooth were characteristic tuberculous nodules with typical giant-cells. This latter case is specially interesting, as it seems to show that a carious tooth may be the seat of a primary tuberculous focus. With regard to treatment, the glands should be at once removed and the carious teeth should be either properly filled or extracted. As a prophylactic, the teeth should be better cared for, and Starck advocates with Rose the placing of school-children under the supervision of a competent dentist.—*Amer. Jour. Med. Sci.*

The Uses of Formaldehyd.—Mr. F. C. J. Bird states that the commercial article known by this name is a concentrated solution containing forty per cent. of the drug. The effects produced by the various solutions are as follows: 1 to 125,000 kills anthrax bacilli; 1 to 50,000 prevents the development of typhus bacillus; 1 to 25,000 forms a useful injection in leucorrhea; 1 to 2500 destroys the more resistant micro-organisms in one hour; 1 to 500 is useful for the irrigation of catheters and as a mouth-wash; 1 to 200 or 250 is a general disinfectant solution for washing hands and instruments, spraying in sick-rooms, and as a deodorant; 1 to 100 is used for lupus, psoriasis, and other diseases of the skin.—*Amer. Jour. Med. Sci.*, from *Amer. Jour. of Pharmacy.*

Eucain.—Görl used a solution of eucain to anesthetize the vesical mucous membrane in a patient with a tumor of the bladder, and found that the introduction of the liquid caused slight smarting and also rather abundant hematuria. This confirms previous observations to the effect that eucain, unlike cocain, produces hyperemia at the seat of application. It must, therefore, be used cautiously when there is reason to fear hemorrhage. As regards the local anesthetic effect, Görl confirms, from an experience of several cases, the statements of other observers who have been satisfied with its power of dulling or abolishing sensation.—*Universal Med. Jour.*, from *Therap. Monats.*

Supernumerary Tooth in the Nose.—Dr. G. Chincini observed, in Professor de Rossi's clinic, a woman, twenty-three years of age, who complained of nasal symptoms, with fetid discharge, crusts, etc. By means of a forceps there was removed from the nasal cavity not a piece of bone, as was thought at first, but a molar tooth with two roots blackened from gangrene. The author believes that this tooth was developed in the nose,

its germ being present there before the palatine fissure was closed. The teeth in the superior maxillary bone had all the characteristics of permanent teeth.—*Universal Med. Jour.*, from *Arch. ital. di Otol., etc.*

HINTS, QUERIES, AND COMMENTS.

Colorado's New Dental Law.—The Governor has signed a bill enacted by the last general assembly to regulate the practice of dentistry in the state of Colorado.

The main features of the bill are that the Board of Dental Examiners shall consist of five members, three of whom shall be recommended by the Colorado State Dental Association. No temporary licenses are to be issued.

All applicants for a license shall be examined by the Board of Dental Examiners. No one shall receive a license or be eligible to an examination who does not, as a prerequisite for such examination, possess a diploma from some reputable dental college.—J. S. Jackson, *Corresponding Secretary Colorado Dental Association.*

Vulcanization of Black Rubber.—The following data are given by a correspondent in the *Journal of the British Dental Association* in respect to the vulcanization of black rubber: "In order to secure a dense non-porous product, vulcanize at 300° for one and three-quarter hours. If using a thermometer, on no account allow it to exceed this heat; if using a pressure gauge, seventy-five pounds pressure for the same time. The thermometer gives the temperature of the lid and not the inside temperature of the vulcanizer, as can be shown by using a thermometer as well as a pressure-gauge, when the following difference will be noticed: The pressure-gauge will register seventy-five pounds and give the inside temperature at 320°; the thermometer will register 295° to 300°, showing a difference of 20° to 25°."

The correspondent states that he has used a self-regulating gauge for ten years, and has had no porous cases during that time.

Nasmyth's Membrane.—The exact nature of Nasmyth's membrane has long been a subject of dispute, some observers regarding it as a cemental structure, others as merely a remnant of the enamel-organ. Recent investigations by Professor Paul, of Liverpool, referred to in the *Journal of the British Dental Association*, tend to show that the latter view is probably correct.

Mr. Charles Tomes, in a recent number of the *Dental Record*, confirms the views held by Professor Paul.

We are indebted to the *Journal of the British Dental Association* for the following:

"The membrane has now been shown to be composed of two layers, the outermost being composed of large flattened epithelial cells, beneath which is a thin translucent pellicle, usually marked with hexagonal impressions derived from the ends of the enamel-prisms. According to Professor Paul the best method of preparing a specimen of the membrane is as follows: A fresh unworn tooth is taken immediately after extraction and placed in a phloroglucin decalcifying solution for a few minutes. As soon as the mem-

brane begins to separate, the tooth is removed and well washed in several changes of water. It is then stained in Ehrlich's acid hematoxylin, again washed, and placed in an aqueous solution of eosin. Finally, the membrane is stripped from the tooth and mounted in Farrant. By this process a permanent preparation of Nasmyth's membrane may be made within a quarter of an hour after the extraction of a suitable tooth, and one in which the nuclei of the epithelial cells are often brilliantly stained."

To the Editor of the Dental Cosmos:

Sir,—With this I send you an interesting specimen received from Dr. J. M. Whitney, of Honolulu. In the letter accompanying it we have the strongest assurance from Dr. Whitney that there was not the slightest thickening or any abrasion of the gums, nor other the nuclei of the epithelial cells are often brilliantly stained."



Notwithstanding the absence of any inflammatory conditions around this root, we find on the apical end, covering it completely, a calcareous deposit corresponding in size to that shown in the accompanying figure at *a.*

An illustration of this kind must fully satisfy the most skeptical regarding the origin of such deposits as not *salivary,* but derived from the blood direct, *sanguinary or serumal.*—C. N. Peirce, Philadelphia.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MAY, 1897.

May 4.—No. 581,861, to G. W. HESSLER. Toilet case.
" " No. 581,986, to A. P. GOULD. Dental chair.
" " No. 582,045, to W. S. DEPEW. Dental plate.
" *11.*—No. 582,213, to E. B. LODGE. Dental matrix.
" " No. 582,342, to E. L. CHAFFIN. Method of treating artificial dentures.
" *18.* No. 582,731, to FRANK FOURT. Dental articulator.
" " No. 582,796, to C. J. PETERSON. Dental mandrel.
" " No. 582,872, to EUGEN MULLER. Apparatus for forming gold crowns for teeth.
" *25.*—No. 583,307, to J. B. KLEINERT. Dental rubber.

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ORIGINAL COMMUNICATIONS.

CATAPHORESIS.

BY HENRY W. GILLETT, D.M.D., NEWPORT, R. I.

(Read before the Dental Society of the State of New York, May 12, 1897.)

MR. PRESIDENT AND GENTLEMEN:

I feel more hesitation in appearing before you to-day than I have felt before in appearing before any society since I began to talk on this subject.

A year ago I thought I knew something about electricity and a good deal about cataphoresis. To-day I feel that I know almost nothing of the first and but little of the second. My limited knowledge and some poor advice has led me in the past into errors of statement, and if I seem to contradict any of my own previous work, I trust it may be credited to an advancing knowledge of my subject.

In one of the articles introducing the practice of cataphoresis to the profession your essayist, after giving a definition of the term, made use of the following expression: "When we consider this definition in connection with the human tooth, which generations of our profession have been striving to penetrate with some drug which should modify its sensitiveness, or with applications which should modify morbid conditions of the tooth-pulp, it becomes at once important, and indeed imperative, that we make use of this principle, if we find it possible to do so."

The indorsement of that statement has been a most emphatic one, as evidenced by the reports of society meetings and the pages of our journals since that time. In spite of the mass of material which has been presented, there still remains much opportunity for advance in our knowledge on this subject.

As a profession we are limited in our opportunities for scientific

investigation, and prone to build up theories upon insufficient clinical evidence.

For the broader extension of our knowledge of this subject in several different directions there is needed the co-operation of such electrical experts as are found in our leading technical schools, having at their disposal the best laboratory conditions, with dental practitioners trained to interpret accurately the phenomena presenting and also familiar with electrical principles.

Your essayist would present for your consideration the suggestion that it might well come within the province of a large society like your own to see that two or three selected men have placed at their disposal the needful conditions for exhaustive scientific research in this subject for the benefit of the profession. A very few dollars from each member of such a society would, if rightly expended, add much to our definite knowledge.

It has been found, as we have broadened our grasp of this subject, that our views of the process are materially modified. Even our definitions have to be changed, and we are no longer able to indorse the position formerly held,—that all solutions would be carried into the tissues in the direction of the current flow. Some of them travel in the opposite direction. This was suggested in some of the early discussions, but the opinions of most weight at that time were against such a view. The most definite experimental work in that particular direction that has come to my notice is that reported by Professor W. J. Herdman.*

His investigations indicate that the process we are considering is nearer to that of electrolysis than has been held by most experimenters; also that the behavior of any particular drug can be determined only by experiment. It has been found by careful laboratory experiment that not only eosin, which is named in all the books on this subject, but many other substances, will travel from the negative toward the positive under the influence of the galvanic current, reversing what we assumed in our earlier definitions to be settled. Professor Herdman prefers the term anaphoresis for this reversed movement.

Following up this line of investigation, he says, "Since it has been found that the nature of a substance determines the direction it will travel in a solution, when that solution is made part of a direct current, strong evidence has been educed to prove that what we term cataphoresis and anaphoresis is nothing more nor less than the migrating ions in the process of electrolysis, the positively charged ions seeking the negative pole and the negatively charged ions being attracted to the positive pole."

He finds, however, by laboratory experiment that just what we have been assuming from clinical evidence takes place, namely, that with correct conditions, drugs, or at least some drugs, may be transferred without this decomposition, the compound molecule being carried as a whole in one direction or the other, according as it be electro-positive or electro-negative.

*Bulletin of the Electro-Therapeutical Laboratory of University of Michigan for January, 1897.

This movement of the molecule as a whole is what we want in our clinical work, and an important point to note in the conclusions from the laboratory experiments is that only the weaker currents produce such phenomena of transference. Stronger currents are more likely to decompose the substances into their elements, and we then have electrolysis pure and simple. The intimate relations of electrolysis and cataphoresis are undoubted, and it seems probable that many drugs may not be capable either of cataphoric or anaphoric transference, but the evidence is conclusive that the two processes are distinct, with suitable conditions and substances.

It is thought that a current for cataphoresis should not exceed in density two or three milliamperes per square centimeter, but the exact current strength best suited to any particular drug, as well as the direction in which that drug will travel, are matters which may well be settled by actual test under satisfactory scientific conditions. It happens that the physiological test for cocain is so marked in its results and the chemical tests for detecting its presence in small quantity so difficult that clinical evidence is more satisfactory in determining the results of its use. The conclusions arrived at by the earlier experimenters with this drug are supported by the more advanced work of to-day, namely, that it is cataphoric, and that currents ordinarily employed in such work do not decompose it.

Potassium iodid, on the other hand, is an example of the opposite conditions as regards decomposition and direction of movement.

The disputed point as to which electrode this drug should be placed on in attempting to drive it into the tissues was the subject of careful investigations in the researches referred to, and the conclusions were these: "First. If the potassium iodid solution is placed in contact with the anode and the current used is of therapeutic strength and density,—that is, not exceeding two or three milliamperes for each square centimeter of electrode surface,—it will electrolyze the potassium iodid in the immediate vicinity of the anode, the iodin remaining at the anode, while the potassium hydroxid is driven toward the cathode. Second, If the potassium iodid solution is in contact with the cathode, and a current of like strength and density is used, the potassium iodid is carried toward the anode and is not electrolyzed until it reaches the anode. Decomposition then takes place, iodin is set free at the anode, and potassium appears to return to the cathode, since, subsequent to decomposition at the anode, the alkalinity at the cathode increases."

These conclusions are of value, since we might wish to use the drug for influencing the absorption of exudation and abnormalities about the jaws, and because they point to the need for more careful researches than have yet been published concerning the results of the electrical use of iodin in inflammatory conditions.

In our early work we assumed that an iodin solution, when placed upon the anode, would by suitable current be carried into

the tissue. In order to test this point, I performed the following experiments. In each case the material to be traversed by the drug and current was the fitted cotton material known commercially as cottonoid. In each case two similar strips, about one-half inch wide, were saturated with tap-water, laid upon a towel to absorb enough of the water so they would not drip, and one (A) was used for the experiment and the other (B) for a control:

Experiment 1. Strip A suspended from anode to cathode, which were placed one and one-quarter inches apart, two drops of comp. solution iodin (iodin, five parts; iodid of potassium, ten parts; water, eighty-five parts) placed at each end of the strip. The control strip B was suspended in like manner from the edges of a tin box. A current of two milliamperes was passed through strip A. The iodin stain soon began to leave the cathode and travel toward the anode, and the region about the cathode became whiter than the surrounding cotton and markedly alkaline, indicating the presence of the potassium salt.

In the control strip B there was a slight spreading of the stain in all directions by capillary attraction.

Experiment 2. Electrodes, one and one-half inches apart, the anode one-quarter inch higher than the cathode. Cottonoid suspended as before. Two drops of compound solution of iodin placed at cathode and at lower end of control strip. With one milliampere of current, in seventeen minutes the iodin had all left the cathode and was collecting at the anode or on the way there. In the control strip it remained about where it was placed.

Experiment 3. Same condition as No. 2. One drop compound solution of iodin placed at the top of strips. Current of two milliamperes passed through A. During the next ten minutes the current pressure was raised from twenty-two to eighty volts, but the current steadily decreased and stood then at one milliampere. The iodin spread less than on the control strip.

Experiment 4. Electrodes one inch apart, and anode one-quarter inch higher. Alcoholic tincture of iodin placed at cathode. Current of two milliamperes, which gradually rose, without change of pressure, to three and one-half milliamperes, dropping back to two and one-half milliamperes, as the iodin worked toward the anode. In ten minutes the edge of iodin stain had reached the anode and left the cathode entirely. On the control strip it had not spread more than one-eighth inch in any direction.

Experiment 5. Same condition, but the tincture of iodin placed at the anode and at the top of the control slip. Current of two milliamperes, which gradually decreased to one-half milliampere till a little salt was sprinkled on the strip, when it rose to five milliamperes. The iodin stayed at the end where it was placed in each strip. While the iodin is passing through the strip its conductivity seems to be increased, but when it collects or is placed at the anode something greatly increases the resistance.

Experiment 6. Electrodes three-quarters of an inch apart, and the anode three-eighths inch higher than the cathode. The control strip in similar position. Three drops of nearly saturated solution of potassium iodid placed at cathode. Current started at two milliamperes. In seven minutes it rose to eight milliamperes, and an iodin stain had surrounded the anode without being apparent between the two.

Experiment 7. To make assurance doubly sure, the platinum wire of the anode was cleaned in alcohol, as after each previous experiment, and was then heated to redness, to drive off all possible trace of iodin. The anode was placed two inches above the cathode. Then two strips of cottonoid were suspended from it, one only being in contact with the cathode. Each received as nearly as possible the same quantity of potassium iodid. Through A a current of one-half milliampere was passed. This quantity increased very slowly without change of pressure. In seven minutes the iodin stain was apparent at the anode, and the current increased quickly to two milliamperes, and at the end of ten minutes it had reached four milli-

amperes. The iodin stain at the anode had then become a broad blotch, but no trace of it was discernible between the two electrodes. A current was then passed through control strip B with negative results.

These experiments tend to confirm the conclusions concerning potassium iodid quoted from Dr. Herdman. They show that iodin in compound solution or in tincture travels, under the influence of the galvanic current, from cathode to anode. They indicate that the cataphoric and anaphoric effect extends all the way from one electrode to the other, and not half-way through the electrical resistance between the two, as has been held by some authorities.

One of the directions in which special investigation is desirable relates to the time necessary to produce the anesthetic effect in sensitive dentin. In two years we seem to have made little or no progress in that feature. The profundity of effect in any given case seems to be strictly proportional to the quantity, or rather density, of current flow and to the length of application. It seems improbable that this will be changed, but it is still to be hoped that some drug or combination of drugs, or some previous preparation of the tooth, may cut down the time to a lower limit. Individual cases are common enough where six or eight minutes' application is ample, but so are cases requiring thirty or forty minutes.

The success of the process as a means of controlling sensitiveness of dentin is so abundantly proved by the reports of a large number of operators that it seems difficult to understand the position of those who meet with little or no success.

Up to within three months the essayist has felt free to say that he doubted the existence of a case of sensitive dentin that would not yield to cocain cataphoresis when properly applied.

There are, however, certain cases where it seems very doubtful if any length of application will succeed. These cases, in the speaker's experience, all come in the class of teeth where there is evidence of the deposit of secondary dentin of dense quality, the irregularity of its structure seemingly proving an insurmountable barrier in some cases to the passage of sufficient current. Of course, the cases where the mechanical difficulties of insulation are practicably insurmountable are thrown out of consideration by that fact.

One unique case met with recently deserves a moment's attention. In this subject there is a predisposition to inflammatory conditions about the attachments of the teeth. The preparation of a moderately large cavity or the packing of gold in a small one is followed by a pronounced pericementitis of such proportions as to forbid gold work. The marked sensitiveness of the dentin in this case yielded in a normal manner to cocain cataphoresis, but the pericementitis was increased to a marked degree by the irritation from the passing current, and when, two days later, a second attempt was made on some of the same teeth, the pain located in the pericemental region compelled the abandonment of the treatment. Apparently the most prolific source of failure is the incomplete preparation of the operator for his work. At the present

time it is inexcusable for the operator to attempt the use of the process without careful study of the readily accessible literature of the subject, and without familiarizing himself with the apparatus, methods, and the possibilities.

Having done this, there can be no question but what the process is one which will be found useful in a fair proportion of cases in any practice where an effort is made to maintain a high professional standard.

The most favorable cases for the use of the process, as regards quick results, are those presented by children, and by the subjects with the teeth usually described as soft. Cavities which have not been previously filled generally yield more easily than those that have been filled, although this may not hold good in cavities where there has been a good deal of new decay under the filling.

The teeth that cut hard and those that have had fairly tight fillings in them for some time present more difficulty and require longer time.

The following question sent out by the committee of the American Dental Association on this subject is of some importance: "To what extent and where are we justified in using cataphoresis? Is there danger of injuring the dental pulp or other tissues by its use?" First. To what extent? I would answer, To any extent that you feel the case calls for and that your patient desires. Willingness to compensate you for the time is, of course, an element in the matter. In dentin I see no reason why we should not be governed by the same rules as for any other application.

As to the danger of injuring the dental pulp and other tissues, it is axiomatic that any powerful drug or application is capable of doing injury if unwisely used. If a pulp is covered by only a thin layer of dentin and a prolonged application of current is made, if, as the pulp becomes fully anesthetized and able to bear it, the current strength is increased unduly, it seems probable that injury would follow. If in bleaching a tooth by this process a leak is left, so that the current and drug can pass through the gum, it will of course be affected injuriously. I cannot conceive, however, that an intelligent use of the process can lead to ill results.

There certainly seems none to be anticipated in dentin or in the pulp. I have as yet seen no instance in which I could trace an undesirable sequence to the effect of the current or the cocain. One case was recently reported in which the patient, a member of this society, I think, felt that the pulp had been poisoned by cocain. One well-established case of this sort would demand our most careful study, but in view of the hundreds of cases where the cumulative evidence is that no such result is probable, it would seem that the evidence that the ill result was due to the cocain needs careful analysis, and that all other possibilities must be first considered.

It is necessary to bear in mind that a cavity sensitive enough to call for cataphoric treatment will probably be sensitive to thermal changes if a metallic filling is placed in contact with the dentin,

and that all cavities that have been anesthetized should have a non-conducting layer placed under such filling.

Some one has raised the question as to whether or not the life of the dentin is destroyed in the anesthetized layer. A very little experience removes the fear of this, since the sensitiveness soon returns to the dentin, no matter how profound the anesthesia has been.

The use of the process for bleaching seems to find favor with many who have used it, but some claim it is not a quicker process for such work than others that are at our command. It certainly does produce very positive results when used with suitably prepared solutions. For anesthesia of soft tissues the process does not seem to the essayist to be likely to supplant, in ordinary practice, other methods previously in use. I note in a recent society report that the process is scored because it failed to produce sufficient anesthesia for painless extraction of a molar tooth. Such work is entirely outside the province of cataphoresis, and even with prolonged application success should not be expected. It is very unlikely that the current will pass through the alveolus so long as it is free to follow the soft tissues.

For operations on the gums the process may often be of service, although the hypodermic syringe is frequently more prompt and more readily used. For the application of other drugs to the gum, some of which have been mentioned, and for the treatment of chronic and otherwise incurable abscesses, the process presents interesting possibilities, and reports are beginning to appear concerning such use of it.

It is well to bear in mind that the cataphoric use of iodin and similar drugs calls for extreme caution, and that such drugs, if carried deeply into the tissues, may produce disastrous results.

The source of current supply is an important and sometimes a perplexing problem. Beyond all question, the 110-volt incandescent lighting system is the most convenient and least troublesome source of supply under favorable conditions. If the plant drawn upon is well equipped and well managed, it presents so many advantages in the way of reliable supply, ready adaptability, and freedom from burdensome attention in keeping apparatus in order that those who have once had experience with it are reluctant to give it up. It must, however, be admitted that authorities differ on the question of whether there are dangers connected with its use too formidable to be overcome.

The local conditions pertaining to any particular plant have much to do with the question in the individual case, and it is needful that each reporter investigate these conditions for himself, until such time as we can have more authoritative utterances than have yet been presented. It is well understood by this time that a current from a system which shows sharp fluctuations in voltage is not a feasible source of supply, simply because it is too likely to irritate the patient. These minor fluctuations can do no real local injury, but, of course, a very nervous subject will be unfavorably affected by them if they are apparent.

The better class of cataphoresis outfits are so constructed that the normal range of voltages of the lines can do no more injury, even if some portion of the apparatus gives out, than a set of batteries would do under the same conditions. To make apparatus that will not permit of a proportional increase of current in the working circuit, in case of an unexpected rise in the voltage, is another matter. If your voltage is multiplied by five, your current will increase in proportion. Such an increase is not dangerous with such currents as we use, except to the peace of mind of the patient and operator. Fuse wires, automatic circuit-breakers, and the small chance of the increase occurring are the safeguards, and each must estimate for himself. The possibility is to be admitted; the probability is small. As compared with the dangers of general anesthesia it is of minor importance, yet we administer general anesthetics without hesitation.

Within a few days I have found an automatic circuit-breaker which impresses me very favorably as a safety device. Its manufacturers claim that it can be adjusted so delicately that an increase of one per cent. in the current being used will operate it with certainty. This would be too delicate an adjustment for our use, as the slight normal fluctuations of the dynamo current would be sufficient to cut off the connection. If the claims made for it are well founded, it will prove a satisfactory protection against cross-circuits with high potential wires. I have the promise of opportunity for full and exhaustive examination of the device, and hope to report upon its merits soon.

The dry battery cell presents an eminently safe source of supply, and has the merit of being feasible in any location. Unfortunately, the dry cell does not prove as reliable as the dealers would have us believe. Very often a set of cells will give entire satisfaction for a year, or even two or three years; but, on the other hand, a single cell will sometimes give out and interfere with the efficiency of the whole set just when you want it most.

A little time and skill will remedy this, if you have suitable testing apparatus. The first is often lacking, and the second is rarely found in a dental office at present.

Storage batteries have not yet been tested sufficiently to warrant positive statements as to their efficiency for this work. They present some desirable features. Theoretically, the motor generator presents qualities that recommend it to the mind of the electrical engineer over most of our sources of supply. By its use the convenience of the dynamo, ready at any moment to do service, is obtained, and with none of the attendant possibilities of danger, since the street wires are entirely cut off from any connection with the patient.

In such apparatus we have first a motor run by the street current, which in turn furnishes power to run a small dynamo of such capacity as is suited to the work to be performed. In the case we are considering, for instance, one capable of delivering a twenty-five, thirty, or fifty-volt current as a maximum; supplied with this, we are provided with absolute safety, and as near absolute relia-

bility as is obtainable. Unfortunately, such an outfit means a larger cash outlay than most practitioners would feel warranted in making, and an undesirable accumulation of machinery about the office. The theory has not yet, as far as I know, been put to practical test in such work, and difficulties may present themselves when it is tried.

For the control of the current we have, broadly, two principles, namely: the rheostat in series with the patient and the rheostat in shunt with the patient's circuit. Both attain the same results, and superiority lies only in perfection of detail in development of the two principles. Which principle will finally provide us with the best instrument is still a matter of opinion. When this paper was first promised I had in view certain experiments to be made especially for it, and from which I hoped for results worthy of extended report.

Some of you will remember that Dr. Rollins suggested, some time ago, the use of the current from a static machine.

By the kindness of William E. Clark, S.B., and Professor C. A. Adams, of Harvard University, I had placed at my disposal laboratory facilities and apparatus for experimentation.

The important items for our experiment were a D'Arsonal galvanometer capable of registering one-millionth of a milliampere, and a Toepler-Holtz static machine capable of delivering a heavy bright spark of eight to ten inches between the terminals on open circuit. Under these conditions the voltage of the current is estimated at 800,000 to 1,000,000. This current, however, would be of the alternating variety, and unsuited to our requirements. By removing the condensers the machine furnishes an indirectional current, and our first move was to measure the volume of the current, passing it through a rheostat of 8,000,000 ohms resistance. It was found very small, as was expected, and to vary with the speed of the machine. The surprise was in finding that 8,000,000 ohms cut no figure at all in controlling it. The current was practically the same, whether the resistance was in or out of that circuit. This brought out two points,—that the static current can be measured, and that the feasible method of controlling it would probably be by modifying the speed of the machine. Next I passed through my left upper cuspid (a labial cavity) the full current from this machine for ten minutes, with all other resistance cut out of circuit. A maximum of two-tenths of a milliampere was reached, and an average of a little less was maintained. You will note that our very high voltage had disappeared, as, by calculation, assuming the resistance of the tooth and body in this case to have been 50,000 ohms, the voltage required to produce the two-tenths milliampere would be ten.

The effect of this current was precisely what might be expected from any current of equal volume, indicating that no different results could be expected from such an outfit than for any other delivering the same volume of current. Further applications were made to the same cavity, but no points of value were brought out.

The closing incident was interesting, and would prove highly

exciting in private practice. At the conclusion of our last effort the negative electrode, which was part of the rubber-dam holder, became detached and fell over back of my shoulder. A series of static sparks passed at that point that made the experimenter feel decidedly lively for a few seconds.

It seems just possible that the readiness with which this current passes through resistance might make it of value in a tooth presenting abnormally high resistance. To make it a feasible apparatus, however, would be expensive, and, in the estimation of those participating in the experiment, it would not prove worth while.

The Need of a National Dental Organization.

BY B. HOLLY SMITH, M.D., D.D.S., BALTIMORE, MD.

(Read before the Dental Society of the State of New York, May 12, 1897.)

Gentlemen: So much has been said and written about professional organization that I can assure you it requires no little resolution for me to indulge myself at your expense, and bring forward for a few minutes' discussion that which may seem at first thought hackneyed and stale. In my own estimation, however, it glows like a coal of fire, and can never be old or tiresome until it is satisfactorily and effectively accomplished, however much effort or time the task may cost. It is in the hope of awakening or reawakening your interest and enlisting your cooperation that I bring the matter up at all, and if I can establish logically and to your satisfaction reasons for the hope I entertain, I am content to leave with you the question, "Do we work together for a common cause?" It may be pertinently asked, "What is the function of a dental society?" and, you may say, impertinently answered, "Educational and governmental." The Master said, "Where two or three are gathered together in my name, there am I in the midst," and I make so bold as to say that in whatever hamlet, crossroads, town, or city a number, be it ever so small, of professional men meet in council, the object, and almost inevitably the result, is: First, educational; and, second, governmental. The society says to its members, "Participate in the benefits of this organization and be loyal to its regulations." It does not detract from the fixed aim or inevitable result of such an organization to say that the fullest realization of its benefits is often, if not always, abridged by an imperfect plan of organization or such disloyalty as will crop out in all human aggregations.

As an educator, taking a lively interest in the material with which I have had to deal, I have had the opportunity of seeing and measuring the definite results in individual cases of the educational influence of a local dental society, and I have no hesitation in saying that these organizations have a mission in the development of professional character and the perfecting of post-graduate training which they are not always given credit for.

It is perhaps not unfair to say of our dental colleges that they

fail to clothe their graduates universally with many of the ornamental yet no less essential qualities which go to heighten our esteem for the man of riper years and more extended experience. Young men, whose business instincts have been sharpened by competition in trade, are often willing to sell themselves to an advertising quack for a fat weekly installment, rather than more slowly and laboriously undertake to make a name and place in their community. These men may have been good students and, more's the pity, good dentists, but they have lacked the beneficent influence of a dental society. Their years of busy student life, their struggle for practical information, their hot competition for class distinctions have failed to develop the idea of fraternity, *esprit du corps,* and professional ethics. Such men have been reclaimed by societies, and have lived to honor and bless their benefactors.

Professional societies are, in fact, simply public opinion centralized, organized, and clothed with certain definite powers, to which any man of character or even ambition must hold himself subject; and though these powers belong to nature's intangible forces, they are none the less real and bring forth most beneficent results.

A society is notably a professional conscience-builder. Just how these results are obtained it would tax our ingenuity to explain, but under the fostering care of our dental societies we have seen our profession grow from a mere adjunct of a trade to a body of men having the highest sense of loyalty to their profession and regard for each other and their duty to their fellow-men.

Now, as the local society deals with the individual, broadening his lines of practice, stimulating him to greater effort, awakening and developing in him a professional conscience, does it not merit some stimulus, some pattern, some help? Through what more natural source should such help, advice, and stimulus come than through an organization truly national in character, whose authority and jurisdiction are beyond question? That such an organization has long been desired will be admitted by all, and several efforts have been made to effect it: first, by coalescing the two societies which have each a semi-national character; second, by forming a national society without reference to these. It could not possibly help us now to discuss the causes of past failures, but rather let us show cause for future success.

The evolution in America of educational processes and methods is gradually, but surely relegating to obscurity many of the factors heretofore regarded as important, and taking up and forcing into prominence features whose value has until now failed of appreciation and esteem.

A notable impetus has been given to education by the perfecting of organization, the collecting together under the auspices of one corporation of departments of learning embracing the work of specialists in every field. The attention to the minutest detail of all these various departments, the development of the practical in the introduction of laboratories, has so advanced the grade of our American colleges until Dr. Gilman, president of Hopkins

University, tells us that we have nine universities entitled to rank with the best of those in foreign lands; and even our weaker schools have so advanced that any one of them outranks, in its facilities for study and investigation, the opportunities offered by Harvard and Yale of fifty years ago.

As we have before stated the function of the dental society to be in part educational, it must appear that we desire, in calling attention to the benefits conferred on general education by organization, to compare these advantages to those which we believe would surely follow the proper organization of our profession.

The organization of a society whose character is national, whose life shall depend upon the state societies, would not only develop a body capable of making decisions, prosecuting research, and accomplishing professional work, but it would, by bringing the weaker state societies under its control, making these societies the avenues of entrance to the national association, give them support which they have heretofore lacked. Again, by improving the character of work done in the greater organization the stimulus is felt at once in the weaker and smaller.

A national association would, in my judgment, be weakened in authority and lessened in influence if it did not definitely and upon terms of equality extend its jurisdiction through state organizations to every section of our country. Under the existing conditions it would not be possible to form such an organization. State societies which have delegate interests in the American Association, or similar interests, not to be defined yet known to have existed for years, in the Southern Association, would not abandon these connections or see them supplanted.

To those who have followed the legislation of the Southern and American associations it must be very plain that the chief source of hindrance and embarrassment was that any uniform action or consensus of opinion had to be reached through a most devious and circuitous route. Matters of vital importance which have been referred to these two associations have been placed in the hands of joint committees, but these committees had no opportunity to meet and often were never brought together. Thus many laudable and worthy suggestions have been allowed to die, when decisive action by live men on the spot might have effected great good to our profession. Authority, responsibility, and effectiveness are plainly lessened by division.

The strengthening of state societies under the present *régime* is of questionable advantage to the larger organizations. The Mississippi Valley Dental Association, which has accomplished great good,—an old association whose meetings have been largely attended,—decided at its last meeting, a few weeks ago, to abandon the organization. The local and state societies over the section which have been a feeder to this society are doing more effective work than ever, and have divided the interest with the older association. An organization must be effected so that its plan will involve features of permanence; not that this year, and possibly next, a great frolic may be had, of which we might tire the

third, but that authority and activity may be gracefully blended in the settlement and adjustment of matters which interest the whole dental profession, and whose indifferent consideration by organizations heretofore has done much to fatigue and dishearten some of our best men.

Work must be put on foot which will involve years of study and thought; commissions must be appointed to settle mooted questions of practice and direct the line of duty in relation to organizations and projects; funds must be appropriated to prosecute original research; sections must be organized under whose direction and with whose aid the results of this research may be most profitably compiled and presented, and committees or officers must be created or appointed who shall establish a cordial relation between the national and local societies. With these and possibly other matters properly placed under way, interest cannot lag. Every man who has ambition to stir, professional spirit to stimulate, or interest to protect will be involved.

Some Points in the Differential Diagnosis of Protruding Lower Teeth, with Brief Suggestions upon the Treatment for their Correction.

BY JOHN NUTTING FARRAR, M.D., D.D.S., NEW YORK, N. Y.

(Read before the Dental Society of the State of New York, May 12, 1897.)

Protruding lower teeth are somewhat common, though not so common as protruding upper teeth, and, relatively, operations for their correction are not performed as often as those for the upper. The mechanical principles in all plans for shortening the lower arch, however, are the same as those for shortening the upper. In both the force is always applied so as to act in the posterior direction, the anchorage resistance being either the posterior teeth or the back of the head. Desirabode in his work in 1823, and later, Harris in his work, recommended the former plan, while Fox recommended the principle in the latter plan. The mechanisms used at the present time, though similar, are far in advance of those prototypes.

When only a plaster cast representing protruding upper teeth or receding lower teeth is presented to a specialist for correction, and there is no other means of obtaining knowledge of the case, it is difficult if not impossible to determine to which class of deformities it belongs. But when the patient is seen it is comparatively easy. For illustration, if the patient is found to have too prominent an upper lip, and the upper incisors overhang a normally formed lower lip, or if receding lower teeth and lower lip are far behind a normally formed upper lip, it becomes easy at once to determine to which class the case belongs, and also easy to decide upon the plan of treatment to be followed. So it is in regard to protruding lower teeth and receding upper teeth. Plaster casts alone cannot be

relied upon for determining to which class it belongs, nor can the plan of treatment necessary for their correction be reliable. The protrusion of teeth may be real or it may be only apparent. There is a deformity resembling anterior displacement of the lower teeth that is not caused by displacement of the jaw, but is caused by the body of the jaw (lower) being too long, or by being abnormally formed at the angle. These are not caused by wrong proportion of the ramus, nor of the body of the jaw-bone, but by an excessive quantity of alveolar tissue in the anterior part of the jaw, associated with lack of quantity of such tissue in the side parts of the ridge. In some cases it is found that besides the disproportion in the quantity of alveolar tissue, the side teeth are abnormally short, the front teeth being normal or longer than normal. When either or both of these conditions are present, there is a corresponding difference in the plane of the antagonizing surfaces of the front and side teeth. Under these circumstances the side teeth cannot antagonize until the lower incisors rise up in front of the upper incisors, and, more or less, hide them from view. I have seen cases where the difference between the plane of the ends of the front teeth and that of the side teeth was fully one-fourth of an inch.

In these cases the upper incisors are entirely hidden during occlusion by the rising of the lower teeth in front of them.

There are still other cases of abnormalities, resembling protrusion of the lower teeth, that are not caused by anterior displacement of the lower jaw, nor by too long or by abnormal curvature of this bone at the angle, nor by loss of side teeth, nor by too short side teeth or too long front teeth; in fact, the cause of the deformity does not lie in the lower jaw at all, but by the upper jaw being located so far posteriorly that the front lower teeth, in occlusion, are anterior to the upper.

Besides these cases of wrong position of the upper jaw, there is a small number of cases of deformity caused by the upper dental arch being so small that, although as a whole it is normally located, it occludes inside of the lower arch, the buccal walls of the upper side teeth touching the lingual walls of the lower teeth. These extreme conditions are rarely found, however, but there are cases of less degree of the deformity in which the corners of the third molars occlude, the remaining teeth being suspended free of contact. In either of the two last classes of cases the upper lip is so sunken that the deformity is generally regarded by inexperienced persons to partially, if not wholly, lie within the lower arch.

Treatment.—What the best plans are for the correction of these various classes of abnormalities is not a question of guess-work or simple opinion, but depends upon circumstances and conditions. The anterior displacement of the lower jaw resulting from loss of side teeth (thus permitting the two jaws to approach nearer each other than is normal) causing the front lower teeth to slide, scissors-like, upon the labial surfaces of the upper teeth, may sometimes be corrected by so grinding the front teeth that a part of the ends of these teeth will occlude and gradually slide each other

into their proper relations. (This treatment is too scientific to make more than brief reference to it in a paper like this.*)

When the abnormality, however, is caused by disproportion in the amount of alveolar tissue constituting the alveolar ridge, or by two short side teeth causing a difference between the planes of the antagonizing ends of the side and front teeth, it is found that the lower ones are generally so far anterior to the upper that grinding would not often prove beneficial.

If the difference between the planes of the arches is too great to correct by grinding, the teeth of the two jaws should be moved in the directions that will cause the best outlines of the face, and then force the proper occlusion by grinding the interfering parts.

For correcting a displaced lower jaw one of the best plans is by the use of gold thimble-crowns, cemented upon the side teeth; the heading of the thimbles being so inclined that by occlusion the lower jaw will tend to slide posteriorly.

In cases where the upper front teeth require to be moved forward and outward it may be done by causing absorption, or by springing the outer plates of the sockets outward until the best possible contour of the upper lip is accomplished. The object of this is not only to place the front upper and lower teeth in better relation to each other, but, if possible, to move anteriorly and make more prominent the bony foundation of the upper part of the sunken upper lip and the sunken alæ of the nose.

This latter change, moving of the bone, however, cannot always be accomplished without injury to some anterior tooth. This arises from too great strain upon the lateral incisors.

In order to form the best outline or contour of both lips in such cases it is sometimes best, all things considered, to let the lower lip fall a short distance by moving posteriorly the lower front teeth. When there are no missing side teeth, it is sometimes necessary to extract one tooth on each side to permit the moving of the front teeth posteriorly.

Occasionally, however, extraction of one of the incisors (lower) and closing the space thus made by forcing posteriorly the others will suffice for this end.

To bring about the highest degree of facial beauty cannot always be done by following strictly the rules laid down for sculpture, where there is abundance of material and opportunity to obtain any effect desired; but the aim should always be to obtain the highest possibilities toward harmony of all the features that the conditions of the case will permit.

For treatment of cases caused by upper jaw being too small, and of those in which this jaw is situated too far posteriorly, the operations are similar and consist of enlargement or the elongation of the upper arch, possibly associated with reduction in the size of the lower. This reduction may extend throughout the entire lower arch, or it may embrace only the anterior part.

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*See the author's work on Irregularities of the Teeth and their Correction.

Of course, as before implied, in all such cases the degree of defect in expression around the mouth and about the alæ of the nose should govern, in a measure, the extent of change in the position of the teeth. If extraction of any of the lower side teeth and the movement of the front teeth posteriorly would entirely obliterate the delicate curvature between the lower lip and the chin, this moving posteriorly of the front teeth should not be carried too far. In most cases, however, more or less moving posteriorly of the lower lip can be accomplished without entire obliteration of this esthetic curve. That is to say, the general expression of the face can be considerably, perhaps sufficiently, improved by approximating the ideal outline of the facial features laid down by master artists, even though the full beauty of the curve in the lower lip cannot be secured. The correction of the apparent protrusion of lower teeth covered by a too small upper arch, or the arch located too far posteriorly, may be accomplished by screw-jacks or zig-zag wire bows worn within the arch, and so constructed as to bear against the lingual walls of the teeth, or it may be accomplished by a "long-band" worn outside of the arch.

Both kinds of mechanisms are anchored by ferrules, closed bands, or by clamp-bands to the side teeth. If this operation should tend to "scatter" the teeth, it is always prudent to watch the process closely, so that if the teeth tend to separate too far they can be prevented, and be compelled to move in directions that would keep at least ten of the anterior teeth nearly or quite in contact, leaving the sometimes unavoidable spaces made by enlargement of the arch so far back as not to be noticeable. Sometimes to fully accomplish this end in patients having large mouths it may be necessary to move forward one molar on each side, but such requirements are rare.

Should scattering of the teeth occur, resort may be had to the round wire long-band, having hook rings, to which the teeth may be connected by rubber rings in such a way as to draw them together. If the ends of the long-band are fastened to the side teeth by anchor-bands, leaving a space between the long-band and the front teeth, any direction of draught can be made without further use of radial screw-jacks. Of course, the long-band tends to force the molars posteriorly, but these molars will soon return to their former places, after being liberated at the close of the operation. In the majority of such cases the moving of molars anteriorly is unnecessary, as the spaces unavoidably caused between the second bicuspids and first molars will, in the course of a few years, close by the natural forward movement of the molars. If it is necessary to move such molars by art, resort may be had to wedges.

Protruding Lower and Receding Upper Teeth Corrected by an Inclined Plane.—To show the value of an inclined plane, the case of a girl of about thirteen years of age is given. Her side teeth, molars, cuspids, and bicuspids were very short, and although the roots were not fully developed, the side teeth had erupted suffi-

ciently to occlude properly. The lower incisors, however, were more than an eighth of an inch anterior to their proper places and occluded anterior to the upper incisors, the wrong contact causing both the upper and lower teeth to continue to move each other still farther out of place. The lower lip, as a consequence, was of course too prominent, and the upper one not sufficiently so.

The patient could by effort draw back the lower jaw so as to permit the edges of the upper and lower incisors to occlude, but could not draw it sufficiently back to enable the lower incisors to occlude posterior to the upper ones.

All that was necessary to give the short side teeth an opportunity to further erupt, and at the same time force the lower incisors backward and the upper ones forward, was to wear an inclined plane on the lower teeth. This plane was beveled to such an acute angle that all the incisors, upper and lower, moved at the same time oppositely.

CORRESPONDENCE.

An Open Letter.

To the Editor of the Dental Cosmos:

Sir,—Will you kindly give me space to place on record a few facts? There are a few among the older men in dentistry that know me personally, and they also know that I have tried to be in touch with any movement that has been made for the welfare of the dental profession. Many also know that I have felt proud of Connecticut's record and the Connecticut dental law, and the personnel of the Dental Commissioners. The Dental Commission has existed four years, and the profession have been thoroughly satisfied, and no one has heard the slightest complaint against any one of its members. The fact that every individual on the commission was selected originally by Governor Morris (an old-time Democrat), and that no one of them sought the appointment by himself or through his friends, made the circumstance that the entire commission was Republican in politics of so little moment that it was unnoticed. The problem of constructing a state commission wholly regardless of political considerations, and with a single eye to the welfare of the state, was solved by the simple method of leaving the question of appointment just where it had been placed by the wisdom of the Legislature—in the judgment of the Executive. A radical departure from this custom leaves the inference irresistibly to be drawn that, like almost all other commissions, this too must be hereafter conscripted into the service of paying political debts. Without any complaint against him, or any demand or desire, or even apprehension of such an event on the part of the State Dental Association, Dr. Civilion Fones, president of the commission, was displaced at the last moment, and a young, comparatively unknown dentist was thrust upon the board without any

adequate opportunity for the profession to be heard. If our respected Governor hears mutterings to the effect that all important state offices are to be considered as makeweights for retaining the caucus favor and friendship of local bosses, he will, with his well-known candor, give his own administration a searching review, and ask himself if such criticism is not perfectly natural. Should he detect in the play of listening features something akin to incredulity, or even a sneer, when the fundamental principles of civil service reform are eloquently advocated during the next campaign, he ought not to think it strange. If his Excellency made this change for the good of the state and the profession, we submit that it is not unreasonable that the profession should be so assured. They have every right to regard the promotion of a man to a place on this commission as a recognition of merit,—an expression of belief that the efficacy of the commission will be increased thereby. Had a vacancy existed such an appointment might have caused a mild surprise, followed by a patient experiment of watching for the next year the new man's success or want of it. But when a thoroughly-tried, competent, and satisfactory member—chosen by his associates as their official head—is unceremoniously tossed aside to make room for this unexpected new-comer, a man who is not a dental graduate, and who has shown but little, if any, interest in professional affairs, the dental profession will and do regard it as a surrender of the commission to the control of the bosses; a surrender all the more surprising since it was made during an administration that, by reason of its elevation to power by such a phenomenal majority, was independent of political bosses and managers as no administration ever was before in Connecticut. Dental examining boards composed of representative competent men are certain to be of infinite value to the public and the profession. If, however, they are to be composed, in part even, of self-seeking individuals who represent only themselves and local politicians, who surely can have no accurate knowledge as to the peculiar fitness of their protégés for the position, but who can place them, owing to their ability as wire-pullers,—then we may as well recognize the fact that examining boards and dental commissions may become a decided menace, rather than a benefit to the public and the profession. It was a pleasant but a vain hope that Connecticut might continue to hold a record for clean, non-political dental appointments, and I am sure it is with sincere regret that the professional dentists of the country will learn of this new departure.

Yours very truly,

JAS. MCMANUS, D.D.S.

HARTFORD, CONN., July 3, 1897.

PROCEEDINGS OF SOCIETIES.

Dental Society of the State of New York.

At the annual meeting of this society, held in Albany, May 12, 1897, the following report was presented and discussed:

Report of Committee on Dr. Black's Work.

Dr. W. W. Coon. The report will include the secretary's record of the plugs made, and Dr. Black's illustration of the workings of his instrument. Those of you who have missed the demonstration have missed the best part of the meeting. There have been twenty-four fillings made, with the result of three perfect, sixteen shrinkages, and five expansions, from sixteen points down to one point. The sixteen points are .0016 of an inch. This micrometer measures expansion and contraction to the one ten-thousandth of an inch. All the alloys tested, save those which were perfect, which were of Dr. Black's own formula, shrank perceptibly, not only sufficiently to be measured accurately by the micrometer, but to be seen by this microscope, which has a one-half inch objective and magnifies about two hundred times. That is the strongest admissible objective over opaque objects. A very practical point was brought out in making one contracting alloy expand by a manner of manipulation, consisting in amalgamating the alloy in the tube in the process of filling. A more important point is that alloy annealed three days at a temperature of 120 degrees, and made to neither shrink nor expand, manipulated the same way and did not expand. Another important point is a little fad of some operators in adjusting the rubber-dam, that gold foil may be burnished in—the burnishing of foil into the surface of plugs, thereby expecting less contraction. It was done by Drs. Rhein and Ottolengui. The plugs were not changed in their physical properties one iota. The appearances, both with the micrometer and the microscope, are the same when used with the gold foil. Dr. Black has data upon which to formulate the best combination of metals for an alloy.

Dr. Verplanck. I understood the gentleman to say that every alloy shrank except Dr. Black's.

Dr. Coon. Every alloy tested.

Dr. Verplanck. If I remember right, I think there was some made of Alba alloy that shrank and expanded again.

Dr. Coon. Contraction occurred first, expansion afterward.

Dr. Black. The Alba alloys shrank, opening the margin, and afterward expanded five points.

Dr. W. C. Barrett. I have been interested in Dr. Black's work for a number of years. What he has really accomplished is not clear to the minds of men generally. Previous to the commencement of his series of experiments, there had been various others conducted, but none of them had reached any definite results. At the time he took up this work it was to determine not how perfectly A, B, or C could put in a filling. Many people imagine it is a test

of their skill. Many others believe that his work does not amount to anything, because it is not accomplished under the same environments that exist in the mouth. What he really wishes to determine is the physical properties of different amalgams. No man ever devised any law that governed their shrinkage and expansion until Dr. Black did so. The same amalgam, under apparently the same circumstances, has always behaved differently. I remember Dr. Black said he had been making amalgam fillings for forty years, and the idea that he could not put in two that were alike was what appalled him, and that set him to work to find out what the reason was. Any of you who have seen the experiments he has made know the infinitude of the labor he has done. He has brought with him the record of over five hundred experiments, in each one of which the material had to be weighed and measured in the most delicate manner thirty or forty times. From all these he has finally deduced a law by which he can make an amalgam that will always, under all circumstances, be the same and remain the same. It has been a well-known fact that when an amalgam was made and a filling tested by accurate instruments, or soon after, there would perhaps be an expansion. One month after that a filling made from the same materials, differing only that they had been kept that long, put in under exactly the same circumstances, as near as could be determined, would shrink materially, and the reason for this he has been endeavoring to determine. He has ascertained this one great fact, which never was explained before, and it should be in the mind of every dentist, that an amalgam may first shrink and then expand; there must be a scientific law and rules which govern it. Dr. Black has finally determined that the principle which governs all these phenomena is the annealing of the amalgams—the action of heat—which changes their physical character and the relations of the alloy to mercury. He will make a compound of a definite composition, which when placed in a tube under the most careful conditions will expand a number of points. He will then anneal the alloy at a definite temperature for a definite time, and, behold, instead of expanding the amalgam when made shrinks. He has not only changed the expansion and shrinkage range, but also its relation to mercury. Where before it took fifty per cent. of mercury to amalgamate it, it will now perhaps take thirty per cent., and amalgamate just as perfectly. Then there will be no change in the amalgam after that annealing. To determine these things required the most delicate apparatus, and he himself has been obliged to devise and manufacture the instruments for the work. These are some of the things which Dr. Black has determined. He has not tested *fillings*, but the materials out of which fillings are made, to ascertain their physical characteristics and to determine the laws under which amalgamation takes place. We cannot properly utilize any material *in* the mouth until we know what are the laws which govern its phenomena *out* of the mouth. Dr. Black can now indicate a formula (he does not manufacture himself) which will always give the same result. The first definite knowledge we have had concerning alloys and amalgams

has been the result of his labors, and it is but just, fair, and honest that he should get the credit that belongs to him, and that you should have some comprehension of the work he has done.

Dr. W. A. WHITE, as secretary of the section, gave some of the results of the tests:

At the time the section was organized, the gentlemen stated that they did not understand that they were to bring alloys to prepare fillings, and therefore there were not as many tests as Dr. Black would have liked. There were twenty-four tubes filled, with a test of fourteen different alloys. The tubes were first filled by Drs. Butler, Smith, Burkhart, Verplanck, Coon, Boswell, and the second tests were made by Drs. Cowan, Ottolengui, Rhein, and Wright. As the chairman of the section has stated, the alloys tested which showed the best results were those made by the formula of Dr. Black. Those which, you will notice, he calls his special alloys were made for experiment only. To give you the results of all the tests would consume considerable time, as each one was tested five times. Some tests indicated a marked contraction at first, and four or five hours later an expansion. If there are any particular alloys that you would like to know about, you can ask about the same.

LIST OF EXPERIMENTAL FILLINGS.

Alloy (silver 61.75, tin 33.25, cadmium 5.00).—Cut August 10, 1896 (Tube B). Expansion 15 points, margins raised.

Fletcher's Alloy, 1.—Date of cutting unknown (Tube D). Shrinkage 3 points, margins open.

Same—another sample, 2.—Date of cutting unknown (Tube M). Shrinkage 8 points, margins wide open.

Globe Alloy, 1.—Date of cutting unknown (Tube F). Shrinkage 9 points, margins very wide open.

Same—another sample, 2.—Date of cutting unknown (Tube Q). Shrinkage 8 points, margins badly broken.

Alloy (silver 65, tin 35).—Fresh cut, unannealed (Tube I). Expansion 1 point, margins perfect.

Same.—Fresh cut, but annealed fifteen minutes in boiling water (Tube P). Shrinkage 9 points, margins wide open.

Alloy (silver 55, tin 45).—Cut July 14, 1896 (Tube K). Expansion 6 points, margins appear unchanged.

Same.—Cut July 14, 1896 (Tube AA). Shrinkage 10 points, margins wide open.

Alloy (silver 68½, tin 25½, gold 4, zinc 1, bismuth 1).—Cut and annealed November 2, 1896 (Tube T). Shrinkage 0 points, margins perfect.

Same.—(Tube Y). Shrinkage 0 points, margins perfect.

Same.—(Tube AL). Shrinkage 0 points, margins perfect.

Fox & Gerhart's Alloy.—Date of cutting unknown (Tube W). Shrinkage 5 points, margins open.

Same—another sample.—(Tube AK). Shrinkage 7 points, margins wide open.

Mixture of several Alloys.—(Tube X). Shrinkage 6 points, margins open.

Alba Alloy.—Date of cutting unknown (Tube Z). Shrinkage 2 points, expansion 4 points, margins open slightly.

Same—another sample.—(Tube AG). Shrinkage 2 points, expansion 5 points, margins open slightly.

Century Alloy.—Date of cutting unknown (Tube AC). Shrinkage 9 points, margins wide open.

Splendid Alloy.—Date of cutting unknown (Tube AD). Shrinkage 8 points, margins wide open.

Same.—(Tube AH). Shrinkage 9 points, margins wide open.

Standard Alloy.—Date of cutting unknown (Tube AE). Shrinkage 2 points, margins slightly open.

Same—another sample.—(Tube AJ). Shrinkage 4 points, margins open.

Johnson & Lund's Extra Amalgam.—Date of cutting unknown (Tube AF). Shrinkage 5 points, margins open.

Alloy (silver 68½, tin 25½, gold 5, zinc 1).—Cut and annealed three days at 120 degrees Fahrenheit, November 7, 1896 (Tube R). Shrinkage 0 points, margins perfect.

NOTE.—A number of the gentlemen who made experimental fillings have objected to having their names published in connection with the individual experimental fillings. But no dealer or maker of alloys has entered any objection to the publication. Therefore all names of operators have been eliminated and a simple table of results constructed, giving the name or formula of the alloy, the contraction or expansion which occurred during the three days in which the experiments were continued, and a brief statement of the appearance of the margins, as seen with a half-inch lens in the binocular microscope. The letter of each tube filled has been included in brackets, to serve as a reference to the original record, if it should be desirable in the future.—G. V. BLACK.

The president then introduced Dr. Black, who spoke as follows:

Dr. BLACK. I am very glad indeed to meet with this society and make your acquaintance as a society, and also to meet the members personally. Many of you, of course, I have met before, but I have not previously met with the Dental Society of the State of New York, and it gives me great pleasure to do so. I came here at the request of your president, to speak on the subject of amalgams, but more especially to show as many of you as I could the results in testing amalgams for expansion, for shrinkage, change of bulk, for flow or strength, etc. The importance of this subject to the dental profession and, through the dental profession, to all humanity, lies in the fact that so large a proportion of the teeth filled to-day are filled with amalgam. Another fact is that we regard it necessary for the preservation of tooth-structure that the filling-material be perfectly adapted to the walls of the cavity.

In our work with gold, we are particularly careful about the adaptation of the filling-material to the walls of the cavity. In working with amalgam we expect to be as careful, or we should. Our object is to save teeth. If that is true, any change of bulk in the material we use, after we have used it, becomes of the utmost importance. We have here a filling-material widely used for this purpose, the physical characteristics of which, as to change of bulk after using, have not been definitely ascertained. My object has been to show you how nearly I have been able to ascertain these changes. I will speak of changes of very small amount, changes that you are not accustomed to following in physical experimental work. They seem to be small. We speak of .0001 of an inch. I have brought with me a mechanics' rule, used by machinists for fine measurement. They generally use a pocket lens for reading this rule, although a good eye may use it without. One side is marked in sixty-fourths of an inch, and the other side in hundredths of an inch. You can examine the side marked in hundredths of an inch. The measurements I make are ten-thousandths of an inch, in which the one-hundredth of an inch is again divided one

hundred times. That ten-thousandths of an inch is equal to two and one-half microns, which is the unit of measurements used by microscopists. The average measurement of the micro-organisms found in the human mouth is about six-tenths of a micron. You will see that while these measurements I show you are excessively fine from the naked-eye standpoint, when we come to compare them with the measurements in vogue by microscopists they are coarse. If a filling-material shrinks after being put into a cavity, to the extent of .0001 of an inch, it opens those margins for the entrance of micro-organisms. Are these things tangible? Any of the gentlemen who have followed this work as it has been seen in these tubes, knows of his own knowledge that they are easily seen. I will pass this box around; you will find tubes that have been filled at this meeting and some that were filled previously. Some have expanded and some have contracted. With the exception of one, you will not be able to tell the difference with the naked eye. There are empty tubes also. The measurement is done with these instruments. (Exhibiting.) This micrometer works to the .0001 of an inch quite satisfactorily. (As the .0001 of an inch is a long, awkward term, I usually use the word *point* instead.) In working to that degree, with a physical instrument, we are continuously liable to error. A mote here or there may interfere with the correctness of our measurement. By experience we have learned that when two points' shrinkage is shown with the micrometer, we ought to be able to see the opening as a hair-line with the binocular microscope. The tube, after measurement with the micrometer, is transferred immediately to the microscope and an observation taken with that instrument, the one being a continual check on the other. If a mistake is made here by the introduction of a mote, the microscope catches it and corrects it. In this way we are able to arrive at very accurate results, not only with the micrometer, but the microscope reveals the results to the eye. For instance, the first measurement of a filling is marked as the zero for that filling; at the next measurement there is a shrinkage of two points. On transferring the tube to the microscope it was plain that there was an error, for there was an opening of the margin of that filling that showed fully four points of shrinkage. One such error has occurred here. The instrument is a very delicate one, and a little shake or jar will change it. With these checks continually in use we are able to arrive at definite results, and we are able to see these results with the microscope plainly, so that any one can read them. On this subject I have been publishing articles in the DENTAL COSMOS, beginning in 1895, and occasionally since. I have changed my views from time to time as facts have been developed. I began this study knowing a great deal about amalgam. I used amalgams for forty years with earnest and careful study, and I had opinions in regard to them, as most of you have. These opinions were very much in my way. They caused me a great deal of trouble, as perhaps yours do with you. Those opinions interfered with the correct interpretation of the results of my instruments. I was trying to explain the results along lines of my

knowledge of the subject, until the instruments, by adding up fact after fact, pounded them out of my head, and my views had to be changed.

Now, as to general results. The first series of results that I published, in 1895, gave shrinkage for every amalgam found upon the market that I had tested at that time. There was a lack of uniformity of results as to formula. Before I published that I had a considerable number of formulæ made that I used, fresh cut, and it saved me from some grievous errors of opinion in that publication; then I followed the thing along for another few months, and I discovered that the same alloy would not produce the same results two weeks, nor two months, nor several months after, but was changing at every examination of it. Then I put to work to try to find the laws governing these changes. What was it that changed them so? I published a little article afterward, saying it was oxidation, but I had to take that statement back. I will give you in a few words the law I have found. An amalgam (or an alloy, correctly speaking) is changed in its physical characteristics, or in its molecular constitution, in the operation of cutting or filing it. It is hardened just as a gold plate is hardened when you hammer it. Your gold plate, when you anneal it, becomes soft again. If we anneal these alloy cuttings after they have been cut, we soften them, the same as we soften our gold plate. That changes the relation of the alloy to mercury. An alloy that will require fifty per cent. of mercury to make an amalgam plastic enough to take good prints of the skin-markings of the finger when fresh cut, will, after annealing fifteen minutes in boiling water, be amalgamated by thirty per cent. of mercury so that it will take good prints of the skin-markings of the fingers. That change is produced by the change in the molecular constitution of the alloy. This annealing goes on slowly at ordinary temperatures. I have followed it for one year and a half in alloys that I cut myself, and the changes are still in progress. I have laid away some forty different alloys in my drawer, and have been making tests of them from time to time. I made tests of them just before I came here, and I find the changes are still in progress. They are taking less and less mercury to amalgamate them; those that shrink are shrinking more and more, and those that expand are expanding less and less, so that the alloys are not the same in their working or physical properties one week after another. Not a single one of them is the same. By the annealing process we reduce that alloy at once to the normal condition of the metal, instead of its reduction being spread over one or two years. By annealing, so far as we have now been able to determine, we reduce it at once, perhaps in fifteen minutes, in boiling water, or at a lower temperature by taking a longer time. The low temperature annealing, while it takes two or three days or a week, improves the working properties of the alloy very much more than immediate annealing in boiling water. An alloy that will anneal to zero in boiling water in fifteen minutes, —that is, to neither shrink nor expand,—works somewhat harsh, but by taking more time at a lower temperature that harshness is

removed. I began the annealing at a low temperature a little more than a year ago. The first alloy so annealed that was laid away for future test was on April 29, 1896. I have followed that alloy through the year. I have since that time been laying away alloys from time to time, so that last month I made tests of nine alloys that had been laid away for as long as six months and a year. The tests of those nine alloys have been the same as when laid away, or within one point, as close as I can work with my instrument at the present time. One point was the greatest variation I could find. The same alloys laid away without annealing have changed an average of ten points. This as to the permanency produced by the annealing process. Now, the philosophy of that, as I gather it, is this: Each of these alloys will have a normal condition peculiar to it at ordinary temperatures, and a metal that has been hardened by handling or by cutting will gradually, in the course of time, be annealed down to the normal condition by ordinary temperature changes. By annealing we bring about that normal condition at once. That normal condition having been attained, it becomes permanent. This idea, whether it is a correct explanation or not, seems to be sustained by the facts. If you have gathered my meaning as I have gone along, you will see that the facts seem to sustain me up to the present time. We have tested a considerable number of alloys here, and I may make the statement broadly that every alloy that is on the market that we tested here has shrunk sufficiently for the shrinkage to be definitely seen with the microscope. The margins are open. Two of those alloys have expanded afterward. I may give you a few rules: Begin with an alloy of forty per cent. silver and sixty per cent. tin. This alloy will first shrink and then expand; it has a dual movement. The shrinkage will take twelve to twenty-four hours. If it is silver and tin alone, the expansion will occupy two or three days. That is peculiar to all silver-tin alloys that contain less than sixty per cent. of silver. After sixty per cent. of silver has been added that primary shrinkage disappears, provided the alloy is used fresh cut; and when I say fresh cut, I mean that it is used within one hour after cutting. An expansion of one point at sixty-five per cent. of silver begins to appear as the immediate change. That increases rapidly until when we arrive at seventy-five per cent. of silver the expansion will amount to sixty points. From that on up to pure silver, we get continual increase of expansion. From this we will be able to make a formula for an alloy which, when used fresh cut, will neither shrink nor expand, and we cannot change that formula one per cent. without changing the result. If you burn out tin in the mixing of the alloy—in the casting—you will have to account for it.

The changes by annealing follow a somewhat similar order. The alloy of forty per cent. of silver and sixty per cent. of tin, when used fresh cut, will expand twice as much as it will shrink, or shrink three points and expand six. When annealed it will shrink, say eight points, and expand one or two. When we reach fifty-

five per cent. of silver we will have an alloy that, when used fresh cut, will contract but a little—about one or two points—as the primary contraction, and then expand a little. It does not change much when used fresh, but after being annealed it shrinks from twelve to eighteen points, which is the greatest shrinkage found in the whole range of formulæ of silver-tin alloys.

Just run over in your mind the formulæ that have been most in vogue in the profession for the last ten years, and see where they lie as to the proportion of silver. Three-fourths of them contain between fifty and sixty per cent. of silver, and are precisely in the range of the greatest shrinkage we can get in amalgam. Why does that happen to be the fact? For the simple reason that with that proportion of silver and tin we get an alloy that works the smoothest. It has neither the stiff, tough qualities of those containing more tin, nor the granular qualities of those containing more silver. The profession has been seeking smooth-working alloys. As we go up from this point in the scale of silver, the contraction after annealing is less and less. At seventy per cent. of silver it will be four to five points. At seventy-five per cent. of silver there will be no shrinkage, but expansion after annealing. Our range of silver and tin alloys must be between seventy-two and one-half and seventy-four per cent. of silver, to get an alloy that will neither shrink nor expand. This shows that we must work pretty close in the casting of alloys. After we pass that point we cannot get an alloy that will not expand, no matter how much we anneal it.

So far I have spoken of silver and tin alloys unmodified. I have added in my last publication in the DENTAL COSMOS a series of modified alloys,—silver and tin alloys to which other metals have been added. You will find, by referring to the tables presented, that these metals do modify; for instance, five per cent. of cadmium added to an alloy of silver and tin—sixty-five per cent. silver, thirty-five per cent. tin, and five per cent. cadmium added—expands one hundred points when fresh cut. The sixty-five per cent. silver and thirty-five per cent. tin expands one point. When annealed the sixty-five, thirty-five, five expands five points. This gives a shrinkage-expansion range of ninety-five points. Every alloy has its individual shrinkage-expansion range. These shrinkage-expansion ranges are sufficiently determined in the publications in the DENTAL COSMOS. You can glance over those tables and see what the modifications are. All I need is to know the formula of an alloy, and know that it has been put up according to the formula,—that tin has not been wasted or burned out more than ordinary in casting,—to tell you just what it will do. I have now tested seventy-six different formulæ of dental alloys, embracing the whole range that we generally have, and the modifications with different metals that we generally have in alloys. It is no longer necessary that I test an alloy to know what the formula will do. It may be necessary to test an alloy to know what has been done with the formula, because we come to a point when a difference of one-half of one per cent. shows itself plainly with these instruments.

Change in formula made in burning out metal in casting will show itself plainly. We have also learned what the specific gravity of a certain formula should be. If we have the specific gravity of our ingot we know what it will do. We know whether there has been tin lost in the make-up of the alloy, and the amount within a very small fraction.

It is determined that this annealing will hold alloys at one point for one year, how much longer I do not know. There not having been any change at all in one year's time, gives very satisfactory promise that it is permanent. Is it not time, with this one year's experience in testing alloys, and following it up with the test of those that have been laid away for six months, that our manufacturers were taking this up and making an effort to bring the manufacture of alloys to this plane? What is necessary to do this? First, let me say that it will require no more care or skill or training than is now required to produce a hundred things satisfactorily that are now commercially produced, but it will require men who have something of an education in physical science, who have experience in the handling of physical instruments, who have developed a skill in this line of work; and the proper apparatus will be required. It will be fairly exact work that we will want of them.

One of the first essentials is a micrometer. It works finer and closer than the microscope. We get one point closer. The next thing is a binocular microscope, and I put stress on the word "binocular." You can see when an amalgam has shrunk below the margin, and you can see other things that you cannot see with the monocular microscope. You can only use low power, but it catches pretty close. Then you want apparatus for the annealing. Of course, the tubes that I show you accompany this instrument; they are of steel; you look at them and say, perhaps, it is a small matter; but I have expended about three dollars each for them. They are hardened steel; the inner sides are ground and polished with the finest emery before and after hardening, and then with rouge, and the face of the tube is ground upon a hone level and a sharp edge given to the margin. They must be re-ground over and over again. Does it ever occur to you that in making amalgam fillings you might mar the margins of your cavities? In nearly every tube that has been filled here the margin of the tube has been broken, and I may say (I made one of those fillings here) that there has not been a filling made with perfect adaptation to the margins. To make an amalgam filling with a perfect adaptation of the margins, so the microscope may not show gaps (you cannot put your finger in the gaps, of course) is an exceedingly difficult thing, and you cannot do it with any of the alloys that make a mass nice and soft and smooth. You cannot do it with certainty. When you get an amalgam that is pretty stiff and hardens quickly, and has the peculiarity of staying where put, it becomes quite possible, but it is then difficult.

Dr. JARVIE. Does the amount of mercury used make any difference?

Dr. BLACK. I will speak of that in a moment. The annealing

apparatus for low temperature annealing is the ordinary incubator for bacteriological work, using any of the ordinary temperature controllers or thermostats. With these we can set the oven at any temperature we desire between four and five degrees above the temperature of the room, and the temperature of boiling water, and maintain it for any length of time. One hundred ounces of alloy can be annealed together as well as one ounce, provided it is put in suitably small packages; so you see the expense of apparatus for this work is no great item. As to the apparatus for melting and casting, I do not know that I can say anything that will improve upon what is now in vogue. I have not studied that specially. The expense is mostly in the micrometer. That is ten times more sensitive than the micrometers used for measuring watch-pinions and such work, and therefore it is beyond the range of ordinary micrometers.

I have said that the relation of the alloy to mercury is completely changed by annealing. I had one of the gentlemen take one of my ingots of 65-35 that I brought with me. He filed a sufficient amount of that to make two fillings. It was put in a sifter, and after sifting, to get out the coarse particles, it was divided into two parts. Of the one part he made a filling immediately; the other part was placed in a little glass flask, and that was put into boiling water for fifteen minutes, and he made a filling of it. I would like the gentleman to state what he found to be the difference in the making of those two fillings.

Dr. Butler, of Buffalo. As Dr. Black has stated, I took the ingot and filed the alloy, sifted, divided and weighed the alloy and the mercury for the first filling (the unannealed filling), using fifty per cent. of mercury. The result was, when amalgamated, the setting was so rapid that it was difficult to finish the filling, although I worked very rapidly, having been warned that it would set quickly.

Dr. Black. Did you use all of the mercury—fifty per cent.?

Dr. Butler. Yes, and was sorry I did not use more. It was very granular after a few moments' time. The alloy for the second filling was annealed in boiling water for fifteen minutes. I proceeded as in the first filling, using fifty per cent. of mercury. The working was wholly different in every particular, and I spent from twenty to twenty-five minutes wringing out mercury; I was utterly unable, after thirty-five minutes, to finish the filling, because of so much mercury on the surface. Its character was entirely different from that which had not been annealed.

Dr. White. Perhaps it would be interesting to give the record of that alloy under the different tests.

Dr. Black. I know exactly what it is. The first filling gave an expansion of one point, and that agrees with my own results in over one hundred fillings with that formula. The second filling gave a contraction of nine points. The appearance of the margin under the microscope was an opening between the margin of the filling and of the tube, large enough apparently to put in the thick part of a knife-blade. That is an expression of the differences in

the physical characteristics of that alloy that would occur within one or two years, going along slowly from week to week, its rapidity depending upon the temperature at which it is kept. Suppose you buy an alloy. You want it fresh. It is shipped to you during the winter season; perhaps it is placed in the car against a steam pipe. In what condition do you get it? Not the same as it was shipped from New York. The same changes occur slowly when the alloy is kept at room temperature.

In regard to the amount of mercury used in making fillings, that comes out very plainly and distinctly in the experimental tests of alloy. The amount of mercury that is required by an alloy is always to be determined by experimenting and finding how much mercury is required to make an amalgamation that will take good impressions of the skin-markings of the fingers. That is the test I have adopted. That amount of mercury will make a mass that will test the highest in strength and flow that can be made of that particular alloy. Any increase in the mercury over that amount (and three per cent. will come out in the tests of strength) will diminish the strength. Any diminution of the mercury below that amount will diminish the strength. It will flow more and will crush at a lower number of pounds with any diminution or any increase of mercury. There is a variation of three or four per cent. where I perhaps would not find the difference. In the matter of shrinkage and expansion it is the same, but very much less sharp; that is to say, the greatest movement we can get with an alloy will occur when it is mixed with just enough mercury to give good impressions of the skin-markings. That will give the greatest variation as to bulk that we can get. At the same time, it gives the greatest hardness to the mass. Addition of more mercury than that amount diminishes the change of bulk that occurs. Mixing with less mercury than that diminishes the change of bulk that occurs, but neither controls it. For instance, if I take an alloy that shrinks ten points when mixed with just enough mercury to give the strongest mass, if I mix it by Fletcher's method, which is to mix with just enough mercury to form a powder that you can drive together and make cohere, it will shrink six or seven points. The same will be the case if you mix it very soft and put it in with your finger; but the product is very soft in both cases. When you have an alloy that anneals to zero, that will neither shrink nor expand, additions or diminutions of mercury will not cause it to change bulk. You may mix it by Fletcher's method, or mix it soft and slop it in with your fingers, it makes no difference as to shrinkage and expansion, but it does change its strength.

Dr. JARVIE. What do you mean by strength?

Dr. BLACK. We make a plug of amalgam of a definite size. We put it into a dynamometer, or an instrument for testing strength. We put pressure on until it will break and fly to pieces. Note the number of pounds required. A block is .085 by .085 by .085, for instance; it is forty per cent. silver, sixty per cent. tin; that will break, if it has been carefully and evenly made, at two hundred and ten to two hundred and fifteen pounds very regularly. The

same size block made of seventy-four per cent. silver and twenty-six per cent. tin, which is the highest amount of silver that I have gotten to anneal to zero, will generally bear about four hundred pounds. That is what I mean by strength. These are very sharply changed as to strength by less mercury or more mercury. Whether the alloy shrinks or expands, or whether it neither shrinks nor expands, these are sharply changed by the variation of the mercury. I found my assistant could not make blocks quite as strong as I could, although she has made hundreds of them.

Dr. FREEMAN. Do you mix your amalgam in the hand or in the mortar?

Dr. BLACK. I do not care how you mix it, provided certain rules are employed. The first rule is this: the more tin you have, the less trituration you should give it. The more silver you have, the more trituration you should give it, for the reason that the alloys with large proportions of tin dissolve in mercury much more quickly than alloys with small proportions of tin. You ought not to manipulate or chop up your alloy in your cavity with your instrument. After you have once wrung it out, you want direct compression of it; hence, fillings rubbed in with a burnisher are never as strong as fillings pressed in with a broad serrated point.

Dr. W. W. WALKER. Do you wash your amalgam?

Dr. BLACK. No, sir.

Dr. APPLETON. In the annealing, would the dry heat or the moist heat make any difference?

Dr. BLACK. I have found no difference whatever between those put in boiling water and those put in flasks into boiling water. Those annealed *in the water* are spread out when hot and allowed to dry.

Dr. APPLETON. Is your amalgam tied up when you anneal it in the water, in a little bag; or, do you let it float around?

Dr. BLACK. It is in a flask and does not get wet, or the annealing may be done *in water* by simply lapping the filings in a cloth and sinking it in the water. Lately I have always used the flask, because it is more convenient.

Dr. APPLETON. If Dr. Butler had squeezed out the excess of mercury, would he have been able to diminish the amount of shrinkage?

Dr. BLACK. After he had amalgamated the alloy, he could not change the result as to shrinkage otherwise than by waiting until the alloy had proceeded considerably in the setting process. By waiting in that way until the alloy has become hard, he would get less shrinkage. Half of the shrinkage will occur in one hour. If he could hold it before manipulating for half an hour he would diminish the shrinkage, but he would not prevent the margins from opening.

Dr. MEISBERGER. In your measurements, is the temperature of the room taken into consideration?

Dr. BLACK. If you take a range of temperature between zero and the temperature of the human body, we are unable to appreciate the temperature change with that instrument. First, let me

say that all of those measurements are taken from the face of the tube. All thermal changes in the tube itself are eliminated by the arrangement of the instrument. Perhaps I can show you that with this instrument. The set block is caught by its face. [Illustrating.] Consequently any thermal changes that would affect the length of the tube are eliminated. The only thermal change that could be measured would be the difference in expansion between the amalgam filling in the tube and the tube itself. Every other thermal change is eliminated, and that difference between the expansion of the amalgam filling and the tube itself is not found by this instrument between zero and the temperature of the human body.

Dr. STARR, of New York. Have you found any difference by using the alloy cut fine or coarse?

Dr. BLACK. All of the alloys will make a softer mass if ground fine. Those containing a large amount of silver it is necessary to cut very fine in order to make a smooth mass, and it does not seem to affect them in the same way.

Dr. CROUSE, of Chicago. How would you take the conceit out of the dental profession as to making perfect amalgam fillings—what test would you put them to?

Dr. BLACK. The microscope. I know Dr. Crouse has had a considerable experience along this line of work, making fillings and examining them.

Dr. CROUSE. I can add but very little to Dr. Black's excellent remarks. If it had been any one else who published the proposition that he found it impossible to make a perfect filling, I would say, "There goes the wind again!" But knowing Dr. Black for thirty years, as well as I do, I said I would see if he was not wrong this time. I have some good operators about me, and we worked for weeks with the microscope and the tubes and the proper tests. They could not get a perfect margin. I consider it the most difficult material to get a perfect filling with. It requires more care in manipulation. I do not consider it possible for me to make a perfect amalgam filling. I long since abandoned the idea of putting amalgam, such as I get on the market, in crown cavities where the occlusion was directly upon it. Dr. Black asked why I did not put it on the crowns of teeth. I said it bit out of place. It does so more on the grinding surface than on the approximal surface, although it would do so on the approximal surfaces. So the importance of having something as strong as you can get it, and as well manipulated, cannot be overestimated. I do not think I could express my gratitude to Dr. Black for what he has done for me; and as for the dental profession, they should express their gratitude in some substantial manner.

I wish to thank the members of this society for favors received from them, and I would say that I hope the committees appointed will continue their work and send me the results. I have been at this work nine years, and if you keep at it long enough you will get the results all in.

Dr. GREEN. There has been one theory in my mind why it was

hard to make a good margin of an amalgam filling. Dr. Black said if you add an increase of mercury to the filling it would decrease the strength of the filling. When we press the mercury from a filling that mercury never goes to the center of the amalgam, it all goes to the surface. We get the same result when we pack the amalgam into the tooth. We force all the surplus mercury to the surface, and consequently it is weaker and softer at the margins. That may be the reason.

Dr. BUTLER. At Dr. Black's request, I would ask whether the gentlemen who made fillings for him object to having their names published in the proceedings.

Dr. OTTOLENGUI. I do; I object to going on record, for the reason that the method which I attempted to demonstrate is exceedingly important, and I believe the tests made in those tubes, and under the manipulation and the disadvantages under which I labored, are utterly inadequate, and should not go on record for or against that method. I had No. 4 gold instead of No. 1½, and I was unacquainted with the matrices, which hold about three times as much amalgam as I ever pack in any cavity. I should be delighted in my own office to fill as many tubes as Dr. Black wishes.

The PRESIDENT. I would suggest that those who object to having their names published shall file their objections with Dr. Black.

Dr. BUTLER. Dr. Black also wishes to know if they object to having the name of the alloy published.

The PRESIDENT. They can do the same with reference to the alloy. If they have any objections they can file them with Dr. Black.

The SECRETARY. Then, if there are no objections filed the results will be published.

Dr. BLACK. I was perfectly willing in the Illinois State Society that the results of tests should not be published, neither the names of the men nor the alloys. I had then nothing to offer in its place. The time has come now when manufacturers should take hold of this thing and see what can be done. These tests ought to go to the profession just as they occur. This is a test of the conditions of alloy—not a test of the skill of men.

Dr. ALFRED R. STARR presented the following

REPORT OF THE COMMITTEE ON PRACTICE.

Mr. President and Gentlemen: The subject which perhaps has been of most interest to us during the past year is that of cataphoresis. This, of all subjects, requires ample time for study and experimentation in order to do it justice. Not having the necessary amount of time to devote to it, and lacking confidence in our ability to thoroughly study the subject, your committee has corresponded with a number of prominent members of the profession, in order to get their opinions regarding the proper modes of using this most interesting method. After having started these investigations, we learned that the society was to have a paper on this

subject by one who has made it a special study. In view of this fact, and also because your committee is not familiar with electrical science, we shall be very brief in our remarks upon this subject, and shall speak only of a few points in connection with the practical applications of the method.

Apparatus.—As a result of our correspondence, we found that the majority use and prefer some form of dry-cell battery. Dr. W. F. Litch, of Philadelphia; Dr. M. L. Rhein, of New York; Dr. S. Freeman, of New York, and Dr. L. E. Custer, of Dayton, Ohio, were the only ones who stated that they preferred the street current. Most of the operators heard from seemed averse to using the street current for cataphoresis, and thought there was considerable danger in utilizing that source of supply. Dr. Peter Brown, of Montreal, kindly sent your committee a photograph illustrating the effect of a stroke of lightning upon a rheostat used in connection with the street current. Personally, we have had no experience, except with the dry-cell batteries and the Wheeler volt selecter.

Electrodes.—Opinions seem to be pretty evenly divided as to whether it is better to apply the negative electrode to the cheek, or to the hand or wrist. Professor Morton and others claim that it makes very little difference where the negative electrode is applied; but in view of the fact that different operators seem to have a preference for applying it in different locations, it might be interesting to determine by experimentation whether there is any saving of time in using one or another location. For the positive electrode, it has been our custom to use a flexible copper wire having a platinum tip, which wire can be fastened to the rubber-dam clamp, and bent in such position that the tip will remain in the cavity or pocket to be anesthetized.

Time Required.—In anesthetizing dentin, we prefer, as a rule, to apply the current for about ten or twelve minutes, running the voltage up to ten or fifteen volts if possible, and then excavate the cavity, re-applying the current if necessary.

In consequence of the great differences observed in the susceptibility of different people to this method, we believe we save time by operating in this way. In many cases one application of this kind will answer the purpose, especially if, before using the current, we have taken the precaution to remove all that portion of carious dentin which can be removed without causing pain. In order to make the application of such strength and duration that the cavity can be thoroughly and painlessly excavated without re-applying the current, we have found it necessary, in most cases, to apply it for at least twenty or thirty minutes, and to run the voltage up to thirty or forty. This, to a busy practitioner, means a great deal, and in some cases we think it will be found that, even with the consumption of that amount of time and the employment of that strength of current, sensation may return before the cavity has been thoroughly excavated.

As a result of our correspondence, we found that most operators prefer to use the current without intermission; that the average

amount of time they required to produce complete anesthesia of the dentin was about sixteen minutes, and that the average amount of voltage used was a little over 17.63. Dr. M. L. Rhein stated that he frequently used as high as from 80 to 115 volts.

Solutions.—We have tried guaiacocain, electro-cocain, and ordinary aqueous solutions of the cocain hydrochlorid, and think we get as good results from a twenty to thirty, or perhaps fifty per cent. solution of the cocain hydrochlorid in "meditrina," as with any other preparation. Most operators favor a strong solution of the cocain, some using it saturated. Dr. Brown, of Montreal, uses two parts of cocain to one of water. Dr. W. F. Litch, of Philadelphia, uses a five to twenty-five per cent. solution; the nearer the pulp, the weaker the solution he employs.

Toxic Effects.—We have not thus far noticed any toxic effects from the cataphoric use of cocain. Whether it is because the amount used is so small, or because the cocain penetrates the dense tissues of the teeth so slowly, we are not aware; but presume both conditions are factors in determining the absence of toxic effects from this method. In the January number of the *Items of Interest* for 1897, Dr. Henry J. Moore, of Frankfort, Germany, reported a case in which toxic effects followed the cataphoric use of cocain in extirpating a pulp. Dr. Moore ascribed the trouble in this instance to the fact that he used the drug well up in the canal, and that the apical foramen was unusually large. Not one of the gentlemen with whom we corresponded had seen any general symptoms following the use of cocain in this manner, nor had any of them noticed any deleterious effect upon the pulp, with the exception, perhaps, of slight temporary congestion or abnormal sensitiveness of that organ.

Bleaching.—For the purpose of bleaching teeth, we know of no better method than the cataphoric use of pyrozone. In some cases the effect is almost magical, and if we never had any other use for the cataphoric apparatus, we would consider it well worth the cost if used for this purpose alone. We may use the twenty-five per cent. aqueous solution of pyrozone recommended by Professor Morton, or the ordinary twenty-five per cent. ethereal solution. Professor Morton claims that, while both solutions are poor conductors of the current, in the aqueous solution you can dissolve some substance to make it a better conductor, while in the ethereal you cannot. If the ethereal solution be used, he advises using a solution of sodium chlorid or sodium phosphate with it, to make it a better conductor. We have used only the twenty-five per cent. ethereal solution, and, in the short time we have employed this method, have been very much pleased with the results obtained. With this solution, using a pressure of from twenty-five to forty volts for about twenty or thirty minutes, we have seen the darkest teeth change to a color as light, if not lighter, than that of their neighbors. If, after one application of this sort, the color is not satisfactory, we may wash out the pyrozone with a solution of bicarbonate of soda, and after drying the cavity well, introduce a pledget of cotton moistened with hydrogen dioxid; cover this with

temporary stopping, and allow it to remain until the next appointment. If by that time the color is not sufficiently improved, we may make another cataphoric application of the pyrozone. The most difficult cases to treat, we believe, are those in which the teeth contain very large fillings.

Most of those who sent answers to our questions, if they had used the process at all, used the twenty-five per cent. ethereal solution of pyrozone, and with a high voltage. Dr. Rhein stated that he used all the voltage he could get in these cases. Dr. S. Freeman claims better results by using a current of compressed air with the pyrozone, instead of the galvanic current. None of those with whom we corresponded had used this method for anesthetizing the bone in operations for necrosis, or for amputating the apices of roots.

We have not been able to experiment much in this direction, but it seems to us that the process could be made very useful for such purposes. We all know that it is well-nigh impossible in some cases to thoroughly and safely anesthetize the parts by injections of cocain, and that we may have to resort to general anesthetics. If we can devise a means of successfully operating on such cases by this method, it will be a great boon to both patient and operator.

Pulp-Canal Filling.—In regard to the proper method of filling pulp-canals, a great diversity of opinion exists, but it seems that the majority of operators prefer to use oxychlorid of zinc or some form of gutta-percha. The ideal material for root-filling should be a plastic, easily introduced, easily condensed, easily removed, non-absorbent, non-shrinkable, non-soluble, and perhaps possessed of antiseptic qualities, but where have we a material which answers all these requirements? In a large, straight canal which is easy of access, your committee recommends filling the apex with a few pellets of gold foil or crystal gold, and the rest of the canal with gutta-percha softened by heat. The efficacy of this mode of procedure is apparent. The gold effectually seals the apex with a practically non-absorbent mass, and the slight amount of fluids which might be absorbed by the gutta-percha in the remainder of the canal cannot do much damage if the apex is thoroughly sealed. Again, the gutta-percha can be easily removed if we wish to insert an artificial crown, or to remove the root-filling for any cause. If the pulp-canal is not of sufficient size, or is not in a situation to permit the thorough condensation of gold in the apex, we advise the use of a more plastic material. Your committee is of the opinion that the introduction into small canals of little shreds of gold foil, by the use of delicate probes, will not give a filling of sufficient density to prevent ingress of fluids. We know that gold condensed in the ordinary manner in canals of moderate size will become malodorous, and we infer that when introduced in smaller canals, with very fine instruments, the chances of contamination are increased.

For canals of moderate size, we recommend gutta-percha softened by heat, and for the smaller canals, cotton saturated with thin oxychlorid of zinc. During the past year there has been

brought to the notice of the profession what is called the "chemico-metallic" method of filling pulp-canals. Dr. G. W. Weld, of New York, who introduced this method, recommends placing in a difficult or so-called "inaccessible" pulp-canal, a point or cone of metal composed of silver, tin, and zinc, which, after introduction into the canal, is to be touched with a specially prepared and slightly modified hydrochloric acid. Dr. Weld claims that the action of the acid on the metals, and on the animal matter in the root, forms an oxid of the metals and coagulates the dead animal matter, thus forming albuminates of what he calls the "sensitized alloy;" that these oxids and albuminates will completely fill the intervening space between the metal point and the canal; that the micro-organisms are destroyed, the root thoroughly disinfected and filled, and that a condition of permanent asepsis results. In the discussion which followed the reading of Dr. Weld's paper upon this subject before the New York Odontological Society, Mr. E. H. Gane (a chemist) claimed that the coating formed on the metal points by the action of the acids was not an oxid, but that it was probably nitrate or chlorid of calcium or magnesium. Subsequent experiments made by Mr. Gane confirmed this view, and showed that the metal remained unchanged. Mr. Gane also claimed that the action of the nitro-hydrochloric acid on the albuminous matter would result in the splitting up of the albumen into other organic bodies of simpler constitution, which would remain, and be apt at some future time to decompose and cause trouble. It hardly seems possible that this formation of oxids and albuminates, or chlorids and albuminates, whichever they may be, would be sufficient to permanently close the canal and prevent the entrance of septic material. In any canal which would admit the finest Donaldson pulp-canal cleanser, we would prefer to ream it out with one of those instruments and use a plastic filling. We have found the Donaldson pulp-canal cleansers invaluable for the purpose of cleansing and enlarging small pulp-canals. One of the chief virtues of this instrument is that it can be made to cut and cleanse without rotating it, and, on that account, can be used to ream out a crooked canal. If one has not used the instrument for this purpose, he will be surprised to see how rapidly it will cut the dentin. In any canal too small to be reamed out for a plastic filling, we would not hesitate to use one of Dr. Weld's metal points in the manner described by him, or, preferably, in connection with chloro-percha or the oxychlorid of zinc. If the metal point were left projecting slightly into the pulp-chamber, it could be easily removed in case of future trouble. In determining the length of a pulp-canal, we must not be misled by the constant presence of moisture in the apical portion, due to capillary attraction. Such a canal, if measured with a broach wrapped in cotton, would be misleading, the moisture being drawn into the constricted portion as rapidly as removed. If the apical foramen be of sufficient size, we can measure the length of the root with a hooked Donaldson bristle, and if the length be greater than the cotton-wrapped broach would indicate, we must endeavor to enlarge the apical

portion of the canal without penetrating the apex. In this way we prevent capillary attraction and facilitate the proper cleansing and filling of that portion of the canal.

Antiseptic Precautions.—In endeavoring to asepticize a pulp-canal, how many of us devote enough time and attention to the process to enable us to even approximate the desired result? The details to be followed are numerous, and necessitate the thorough cleansing and asepticity not only of the operator's hands and instruments, but also of the rubber-dam, bibulous paper, spunk, cotton, filling-material, and every other article used in the details of the operation. Unless we are careful even to the most minute detail, complete asepsis is impossible. In some of the cases we are called upon to treat, even the most expert operator could not apply the rubber-dam; and in many cases, owing to mechanical difficulties and lack of time, the majority of operators, at least, only approximate ideal asepsis. While thoroughly appreciating the necessity of antiseptic precautions, most of us, we believe, will admit a lack of perfect procedure in the treatment of these cases. The patient may come to us suffering intensely and unable to wait for an appointment, so as to allow us sufficient time to carry out the proper details. In such a case, a very busy practitioner must of necessity omit many essential details in the preliminary treatment, or else relegate the patient to an assistant or some less busy *confrère*. We are as yet very much in the dark in regard to the proper antiseptics or germicides to use in treating pulpless teeth; whether it is proper to use coagulants or non-coagulants, and what the exact effect of each would be upon the dead animal matter in the tooth. It behooves us as a scientific body to endeavor, as far as possible, to clear up this uncertainty by patient clinical and chemical experimentation.

Treatment of Acute Abscess.—In a case of acute alveolar abscess we are confronted with the problem of choosing one of several modes of treatment. First, we may endeavor to secure an opening to the abscess through the alveolar wall as well as through the tooth; second, we may simply open the pulp-canal, perhaps enlarging the apical foramen, and leave the canal entirely free to allow drainage in this direction; third, after opening and cleansing the canal, we may introduce a little cotton moistened with some antiseptic, putting it in so loosely that it will not interfere with drainage, while at the same time it will, to a certain extent, exclude food and foreign materials; fourth, after opening the canal and cleansing it as thoroughly as possible, we may fill it up more or less tightly with some antiseptic dressing, and seal this over with a temporary stopping, in the hope that suppuration will cease and the remaining pus be absorbed. The first method will no doubt give the most prompt relief, and allow us to more thoroughly irrigate and treat the abscess than by any other means. The canal may then be temporarily or permanently closed, and if subsequent treatment be necessary, we can utilize the external opening for that purpose. Some of our patients object seriously to this mode of procedure, and will not allow us to perform the

operation, which is sometimes a painful one, in spite of the liberal use of local anesthetics. In such cases, since we can usually succeed by treating in other ways, it would seem hardly justifiable to insist on this operation, and to resort to the use of a general anesthetic with its attendant dangers. We believe that, as a rule, the trephining of the alveolus is not absolutely necessary, except in cases of necrosis, or where we find it impossible or unsafe to remove the root-filling. If the tooth is very sore and tender, and pus discharges freely when the canal is opened, we do not deem it bad practice to leave such a canal entirely free and open for a day or so until the soreness subsides. If the pus is imprisoned in the apical space and does not flow freely after the canal has been cleansed, we may endeavor to pass a fine probe through the apex, or start the flow by pumping out the pus by means of a broach wrapped in cotton. The principal objections to this method are that the abscess cannot be thoroughly irrigated through the small foramen, and that the canal is liable to become closed by particles of food or foreign material, or by the impaction in the apex of inspissated pus, clotted blood, or fragments of broken-down tissue. Some will object to this mode of procedure because there are no antiseptic precautions taken after the pus commences to escape; but in our opinion it is time enough to employ those precautions when the flow of pus has subsided and the soreness diminished. In a case less severe than the one just described, we may resort to one of the two remaining methods. After having, under antiseptic precautions, opened the canal and cleansed it as thoroughly as possible, if there is still quite a little discharge, we may partly close the canal by introducing some loose fibers of cotton impregnated with a non-coagulating antiseptic, and change the dressing as often as we consider necessary for cleanliness. If we find very little pus present, we may, after thorough cleansing, fill the canal more or less tightly with cotton impregnated with some of the essential oils, or any non-coagulating antiseptic, and seal this over with a temporary stopping.

Dr. M. L. Rhein recommends forcing a 1 to 500 solution of mercury bichlorid in hydrogen dioxid through the apex of the tooth in a case of incipient abscess, or even after considerable pus has been formed, and then closing the canal with a cinnamon oil dressing. This method causes considerable pain for a short period, at any rate, and in cases where this method is applicable, your committee believes we may often get equally good results without causing any pain by forcing the same antiseptic solution into the abscess by the aid of cataphoresis. We have not experimented with this cataphoric method sufficiently to be able to state just what proportion of cases will be successful, but in the few cases in which it was tried it seemed to be of considerable value.

Treatment of Chronic Abscess with Fistula.—In regard to the treatment of chronic alveolar abscess having a fistulous opening, there seems to be a remarkable unanimity of opinion. All agree that if the abscess is not cured by proper cleansing and sterilization

of the canal, we must look for necrosed bone or serumal calculus, and perhaps amputate the end of the root. The principal point to be decided in these cases is how to relieve the pain of the operation. Shall we rely wholly on local anesthetics, or are we justified in resorting to general anesthesia, if, as is often the case, local anesthetics will not produce the desired result? Possibly a better knowledge of cataphoric medication, and improved appliances for using it, may solve this problem for us.

While fully recognizing the trite nature of some of the subjects touched upon in this report, we recognize none the less the necessity of having these mooted questions decided if possible. Though perhaps hackneyed and commonplace, they are nevertheless questions of prime importance, because of the frequency with which we are called upon to exercise our judgment in deciding them.

American Medical Association—Section on Dental and Oral Surgery.

(Continued from page 584.)

First Day—*Morning Session* (Continued).

Following is the discussion on the Chairman's address:

Dr. G. Lenox Curtis, of New York, spoke of the interest excited in all ranks at present by the X rays, and thought it probable that they would be of frequent use to the dentist and the surgeon in diagnosing abscessed teeth and unerupted teeth which so frequently are the obscure causes of facial neuralgias and other troubles. One trouble with the use of the X rays was the expensiveness of the apparatus. He thought it would be well if dental societies would own such apparatus and place them at the disposal of the profession.

He asked about the use of silver nitrate in root-canals. Would it so preserve the dentin that filling-materials placed in them would be kept aseptic? His experience was that no matter how carefully a tooth was cleansed and what effort to render it aseptic had been made, a filling was always septic when removed, even though it had only been in place a short time. He thought the proposed examination of school-children's teeth would be of great advantage if it was possible to get the children or their parents to realize the necessity of acting on the results of the examination.

Dr. Andrews said that Dr. Bethel held that the silver nitrate would certainly sterilize the roots, but he could not say whether it would permanently render them aseptic or not.

Dr. J. L. Williams, of Boston, thought the use of silver nitrate might be a good thing for the posterior teeth, but was inclined to think it would discolor them, and that, therefore, it would not be advisable to use it in the anterior teeth. He had seen two cases of people who had been treated for epilepsy by the administration of silver nitrate, whose skins were permanently discolored.

As to the examination of school-children's teeth, the examination should only be made by those who were capable of saving the teeth,—by those, perhaps, who have a fad for saving teeth rather than against it.

Dr. J. S. MARSHALL, of Chicago, said the paper was full of interesting topics, to discuss all of which fully would take up a great part of the time of the section to the exclusion of all other business.

In speaking of cataphoresis, there was no mention made of the use of this means for the treatment of inflamed conditions of the pulp and the pericemental membrane. He had had considerable experience in treating these conditions with the continuous current. His first case was in his own mouth; a tooth had been giving him a great deal of pain, and he had his physician apply the continuous galvanic current, which gave him relief in about twenty minutes by producing an anemia of the parts. A second application the next day gave him permanent relief, and the next year a gold plug was put in the tooth and the pulp was found to be alive. He had tried it in such conditions with his patients, and found much more satisfaction than in treating sensitive dentin with the current.

In regard to the X ray pictures: There is no doubt that this great discovery will be of advantage to the dental surgeon. He had been trying for several years to find some means to demonstrate the lines of fracture in the lower maxilla. With the X ray we should be easily able to demonstrate them unerringly. He had intended to use the X ray for this purpose, but had been deterred by the danger there is in some cases. We hear occasionally of some one burning the tissues of the human subject by the use of the current. After being exposed to these mysterious rays the tissues slough, and a sore is made that is exceedingly difficult to heal. While this is not reported frequently, and most of the cases have been those which require long exposure, the possibility of such a thing has deterred him from experimenting with it.

As to the tuberculous infection of the cervical glands from the teeth: He could not understand how tubercular infection could occur from the teeth, but could readily see how suppuration of the glands should occur from abscessed teeth of the lower jaw. He had seen several cases of this character, from one of which a pint of pus was removed. In most cases there is merely an inflammation of the glands. In such cases he diagnosed infection of the glands from the abscessed tooth, and upon extraction of the tooth the glands recovered. The fact of the recovery proves that the infection is not tubercular.

Dr. G. V. I. BROWN, of Duluth, Minn., thought the danger of tuberculous infection of the cervical glands was not directly from the teeth, but rather that the condition of the teeth would so lower the vitality and natural power of resistance of the system that it would be more liable to be infected by the tubercular germs which were so usually abundant in the air, food, and water that are used. In the matter of examination of children's teeth, it would be well to bring the necessity of the measure to the attention

of civic organizations in the different cities, but after having examined the teeth of children in our schools and found, as we certainly would, that they demanded care the difficulty would be, without charitable institutions to take care of them free of charge, to have those who were unable to pay treated as they should be, and without this little or nothing would be accomplished. One thing, however, we could, and ought to do, is to urge the use of a disinfectant mouth-wash as a prophylactic against depletion of the system by the resorption of the toxic waste products of suppurative and fermentative processes, so commonly present in the mouth, against direct infection, and particularly with reference to treatment in long-continued fevers and infectious diseases.

For this purpose, during the past few years he had recommended before many societies, to physicians, and to his patients a prescription containing listerine, glycerol, and carbolic acid, but now preferred a preparation called thycolal, in which he became interested because, among other well-known antiseptics, its printed formula contained saccharin, which Miller, of Berlin, found to be the most rapid germicide for oral disinfection.

He had found it more satisfactory than the wash containing listerine and carbolic acid, because its flavor was more agreeable to patients and not in any way associated in their minds with the sick-room; therefore, its constant use could more certainly be depended upon. He also thought that the constant use of carbolic acid in the mouth had a tendency to reduce the natural sensitiveness of the mucous membrane of the mouth, which in cleanly persons warns them of uncleanliness and makes brushing the teeth necessary to comfort, a feeling unknown to those who neglect to care for the mouth, and was also lost to a noticeable degree by some of his patients who had used the carbolic wash continuously for a considerable time to prevent the recurrence of pyorrhea alveolaris, as evidenced by their apparent unconsciousness of particles of *débris* sometimes found lodged between the cheek and the gum, where the brush happened to fail to catch them.

Out of fifty-one thousand children's mouths examined in the public institutions of Great Britain, only fourteen per cent. were found free from caries, and there is no reason to believe from similar reports that the children of America are any better.

He thought disinfection of school-children's mouths ought to be compulsory, just as any other sanitary measure would be.

Dr. MARSHALL spoke of the danger of tuberculous infection in the dental chair. Tuberculous diseases carry off more people than any other class of diseases. Warren, of Boston, claims that one out of every seven who die dies from tuberculosis in some of its forms. Dr. Senn says one out of every five. We know that it is infectious and can be contracted through the skin or be imparted through the air or food. Dentists should therefore be very careful that they may not by any possibility inoculate their patients with tuberculosis. They should be as careful to avoid this as they are careful not to inoculate with syphilis. He had known very great carelessness in regard to such things. In a dental college, for

instance, he had seen a demonstrator use the same mouth-glass and the same probe in one patient after another for an hour without washing the glass, probe, or his hands. If such a thing could happen in a college, may it not be that dentists are as careless in their offices?

Dr. WILBUR F. LITCH, of Philadelphia, said that though examination of the teeth of school-children might be done, it would be impossible to get the great majority of them to carry out directions for the care of the teeth when the necessity for it was called to their attention. People are very indifferent about the matter. He had found that among about fifteen hundred pupils of Girard College the teeth of not more than fifty had received proper intelligent care before they entered the institution. He rather deprecated anything that would possibly lead toward the pauperization of communities by dental charities. This subject has become a matter of great importance to the medical world, and there is enough of it from the dental colleges. It seems necessary to dispense a certain amount of free service to give the students proper training while they are getting their education, but more than this is not fair to the profession.

Dr. A. E. BALDWIN, of Chicago, said that in cases reported of infection by dentists it was well to be very careful not to give credence to the report without due examination. Syphilis, for instance, may date very far back, and sometimes the apparent cause is not the true cause.

He believed that cleanliness was more desirable than to depend too much upon antisepsis. Be clean as possible, and then use such antiseptic measures as are needed. He agreed with Dr. Brown that the cases reported as tuberculous infection from the teeth were rather due to the condition of the system. To keep our patients absolutely safe from the danger of tuberculosis we would have to put them in glass jars and exhaust the air,—the germs are everywhere.

Our knowledge of the danger from the X rays at present is so uncertain that it would be well to be careful in experimenting. He had examined his hand through a fluoroscope a short time ago, and for several days there was an uncomfortable feeling in the hand, though it had been exposed to the rays only a few seconds.

Dr. A. P. BRUBAKER, of Philadelphia, thought that the danger of tuberculous infection of patients was not very great, because tuberculous patients as a rule were not of the class who frequently come under the hands of the dentist, and, besides, tubercular germs leave the body only in the sputum, and when this becomes dry they are destroyed, and should they be carried from one patient to another they would be destroyed in the system, unless the patient was weakened by disease.

Dr. MARSHALL said the bacilli of tuberculosis would live for days after they had been desiccated, and the spores almost indefinitely. They are not dangerous to a healthy person, but a slight cold or influenza will render one liable to the infection.

Dr. LITCH spoke of the difference between deodorizers and dis-

infectants, and said that a mouth-wash which was strong enough to be properly called a disinfectant would be too strong for use. He favored the use of the preparations, but doubted that they would have real disinfecting power for any length of time, and thought the alkaline mouth-washes were more useful. He thought that if a child began early to use the tooth-brush faithfully after every meal, with precipitated chalk or other suitable alkaline preparation, he would almost certainly reach adult life without any caries whatever.

Dr. JAMES TRUMAN, of Philadelphia, spoke of what Dr. Andrews's address said of the work of Dr. J. Leon Williams. This all must recognize as able, but his deductions in some respects were faulty. For instance, in several of his illustrations he represents very beautifully masses of micro-organisms, and ascribes to these the destruction of enamel, or the beginning of dental caries. This may be true, but it has yet to be proved that the micro-organism there represented, the so-called Leptothrix buccalis, is an acid-producer. Miller has never been able to make a pure culture of leptothrix. It does not do to support an investigator too fully. We want to get at the truth, and must not always praise a man who has been doing good work, but should examine closely and be sure that his deductions are correct before we accept them as final.

The use of silver nitrate, as recommended by Dr. Bethel, would answer for posterior teeth, but not for the anterior teeth, because it would surely discolor them.

Dr. EDWARD BRANNIGAN, of Boston, said that in the infirmary at Boston they had been using the X rays for months, making examinations on the living human body, and had not burned any one yet, though some of the exposures had been quite extended. They used a static machine for producing the current, which must be a great deal weaker than the one used in Chicago.

On motion, the subject was passed, and Dr. EDWARD BRANNIGAN, of Boston, Mass., read a paper upon "The Need of Dental Education in Medical Schools," in which he claimed that physicians generally were deficient in knowledge of the proper treatment of many ills that arise from defective and unerupted teeth, and consequently their patients suffer unnecessarily. He said abscesses caused by pulpless teeth are still poulticed and opened on the face by medical men. He had seen many of these cases, for of course this treatment does not effect a cure, and the patient, if not the doctor, finally concludes that dental assistance is needed.

A more intimate knowledge of the mouth and the teeth would help other specialists, aurists for instance. Severe and painful inflammations of the ear caused by teeth are common. The removing of a filling from a pulpless tooth had, under his observation, made a number of sufferers from improper aural treatment happy. Oculists are now tracing a variety of diseases of the eye back to the teeth, but they have not found out all the mean things a diseased tooth can do. Many sufferers from irritation of the eye, backed up by an inflamed tooth, do not get to the oculist, and if

the general practitioner knew more of the teeth as the cause of disease he would not in so many of these cases prescribe an eye-wash, or glasses, or a tonic; he would send the patient to a dentist. Tumors of the nose may be caused by a dead tooth-pulp. Treatment of a tumor without a knowledge of the cause is not calculated to make the owner of the nose happy. The victims of neuralgia, who after weeks and months, or even years, of anti-neuralgic drugging die or find relief from the hands of some one who knows something about the teeth, are countless. Thousands of people are to-day being treated for neuralgia who are really suffering from some form of dental irritation. A pulp-stone no bigger than a pin-head may bring about so much pain and loss of sleep, appetite, and health that nervous prostration may be, and often is, the end of an affair that a pair of forceps would have ended in a moment.

Discussion.

Dr. R. R. Andrews said that the medical schools in Boston now were teaching dentistry, and that the young medical men of the present day were not so deficient as those of former days.

Dr. E. S. Talbot said that the late Dr. W. W. Allport, who founded the Dental and Oral Section of the American Medical Association, was influential in having dental chairs established in seven different medical colleges in Chicago. He thought that now most of the medical schools had such chairs.

Dr. J. L. Williams thought that the medical and surgical practitioners were learning to be more regardful of the teeth as to their value, and as causes of diseased conditions about the face, and that dentists should not criticise them too harshly while the dental profession was so full of men who are ready to destroy the natural teeth in order to replace them with artificial teeth, bridge-work, etc.

On motion, the subject was passed and the section adjourned until the next day.

Second Day—*Morning Session.*

Dr. R. R. Andrews called the section to order at 2 P.M., and Dr. G. Lenox Curtis, of New York, read a paper, of which we give an abstract below, on

Resection and Reproduction of the Maxillæ.

The purpose of this paper is to show the importance of special study and instruction in oral and facial diseases, and that these are worthy of the same consideration as is given to any of the fully recognized specialties in medicine. Until they do appear in the curriculum of the medical school, the faculty will not have done its duty toward the student. The field covered by the general surgeon is altogether too extensive for a thorough consideration of any part where such careful minuteness of attention is required to save tissues and assist nature in doing her work. The surgeon most capable of successful teaching in this line is he who has been first trained as a thorough and conservative dentist.

Like produces like; this applies to every department in nature. The periosteum, under favorable conditions, will reproduce the substance it covered. That of the ramus of the jaw will only make the thin lamina of bone which nature has originally placed there, while that of the malar and the body of the jaw reproduces a dense structure differing materially in texture from the original structures.

If the function of a part be permanently lost, reproduction is not a necessity, nature supplying only that part which is required. If the teeth have been extracted with a view to remaining out, the portion of the jaw which is required to nourish them is not reproduced; but where the teeth are replaced and retained, all, or sufficient, of the bone is reproduced and re-attaches them to the jaw. Such I have seen in active use for years.

The only condition I can ascribe for the removal of the periosteum is where it is attacked by disease, such as cancer, and the entire structure destroyed. When the bone alone is destroyed, as in necrosis, cystic tumors, or from pressure by resistance of growth, as a tumor of the antrum, I see not the slightest necessity for removing this natural sheath, but, on the contrary, every reason for retaining it. The general surgeon is too ready to use the knife and saw, by which he saves himself tedious and long-drawn-out labor. But what can we say for his subject? Partially or wholly jawless, maimed and disfigured for life, a repulsive and pitiable object to others and a shrinking annoyance to himself.

I do not condemn the surgeon whose opportunities to acquire knowledge have been dwarfed by the oversight of his teachers.

My method to obtain the best results in the preservation of the contour of the jaw is by retaining the necrosed bone in position until the periosteum has been so strengthened by the reproduction as to allow nature's outlines to be maintained, employing the sequestrum as an inter-osseous splint. Where it is necessary to remove the bone, I retain the contour of the face by gauze packing, and change from time to time until the bone is sufficiently reproduced to resume its shape. This requires frequent dressing, so that the amount of pus may be kept at the minimum. The teeth are retained in position by means of interdental splints or ligatures. Where the teeth are lost, I place other teeth in the opening when the wound is nearly closed, maintaining them by artificial support and allowing the bone to form around them. Where the destruction of the bone has been great and the periosteum is too weak to retain the jaw in position during the process of reproduction, I use an interdental splint in which the upper and lower teeth properly occlude. By hastening slowly, the danger of wounding the dental nerve is materially lessened.

I was once asked to assist a general surgeon remove one-half of the lower maxilla, on account of a tumor which he claimed to be sarcomatous. I saw nothing but the enlargement of the submaxillary gland, due to the septic influence of a tooth-pulp. I labored with him to save the man's jaw, and showed him the error he was falling into. He defiantly replied, "I have said that it is

cancer of the jaw and must be taken out, and I am going to do it." And so, indeed, he did, thus maintaining his wisdom with the patient. The bone he removed was as perfect as nature made it. This is but one of the many terrible examples of what the general surgeon persists in doing. He holds to the methods of the ancients; and scarce can we read a text-book in which are not found methods on treatment of facial diseases in vogue half a century ago.

In 1886 I operated on a young woman, aged twenty-three, with the following history: Four years previously, after suffering much pain in the face, which was swollen, a fistula appeared in the lower jaw which was diagnosed as originating from an abscessed tooth. The gums around the tooth were swollen and inflamed; the molars and second bicuspid were extracted, and the pus continued to flow. Her health rapidly diminished, menses ceased, and had not returned, although constantly under medical and surgical treatment.

Examination revealed the emaciated condition of the patient. She was suffering from blood-poisoning, was highly nervous and hysterical, had no desire for food, and had lost the sympathy of her doctors and family. In the left lower maxilla, where the tooth had been extracted, there were granulations. A boggy condition of the mucous membrane extended all along that side of the jaw. Over the ramus it was particularly inflamed. The probe readily passed beneath the periosteum and far up along the ramus. The patient was then too sick for an operation with a view to best results. The wound was cleansed daily to lessen the amount of pus, and for one month the patient was placed under active restorative treatment with good results. I found that under the local stimulating treatment, bone had been sufficiently reproduced to strengthen the periosteum, so that when I removed the dead jaw the contour was preserved. The cause of the trouble I found to be a third molar lying transversely at the neck of the jaw immediately under the condyle. This, along with the granulations and débris, was removed. The wound was packed continually until healthy granulations filled in the periosteum; the jaw, minus the teeth, was reproduced with all its usefulness. Complete restoration to health and a gain of twenty pounds in weight followed this work. The nerves and vessels in the jaw were not injured, and no paralysis resulted.

Before my class at the New York Post-Graduate Medical School and Hospital, on March 25, 1893, I operated on a lad fifteen years of age, who gave the following history:

Three years before, while at play, he ran against a lamp-post, striking the left side of his face and bruising it severely. A year later there appeared on the face, over the malar bone, a hard lump, which continued to increase until it was the size of a hen's egg, preventing the boy from seeing with that eye objects on the ground near-by without bending his head. He had not realized any special pain or discomfort from the tumor. Thinking the trouble arose from the abscessed teeth, his dentist extracted the upper left

first bicuspid, which showed no evidence of being diseased. I diagnosed an osseous tumor of the antrum, and found that the malar and superior maxillary bones were completely destroyed by the direct pressure against them, only the periosteum remaining. Not only was the tumor directed outward, but downward, depressing the roof of the mouth and extending beyond the alveolar process against the buccinator muscle. An incision was made through the periosteum encircling the teeth, as seen in the specimen here presented, in which the tumor and teeth are attached, and it will be noticed that only a small part of the alveolar process remained intact. This, with the teeth, was removed, the entire side of the face falling into the cavity made by their absence, so completely were the malar and the superior maxillary bones destroyed. The infraorbital ridge and zygoma only resisted the pressure of the tumor. A profuse hemorrhage followed its removal, but was readily checked with hot water. The wound was packed with aristol and gauze, and the contour of the face secured. The periosteum united with the sutures. Through this opening the wound was dressed until the shape of the face was permanently restored. Time of operation, twenty-five minutes.

The following day there was considerable edema, which readily subsided. From day to day the dressing was changed until the periosteum could support itself, and in two weeks the case was dismissed from the hospital. The antrum was douched daily until restoration was complete. An artificial denture was made to replace those lost, to give the normal fullness to the mouth. In this operation there was no external wound, consequently no necessity for ligature and no scarring of the face, which would necessarily follow had the operation been done on the lines drawn in general surgery. The wound completely healed in six weeks with no deformity of the face.

On February 3, 1893, I operated on a gentleman seventy-three years of age who, up to the year prior to then, was in robust health, never needing a physician in forty years. He stated that he applied to a dentist to have the left upper third molar, which was loose, removed, it having elongated, owing to the loss of its antagonist. As the dentist was using the forceps the patient noticed that they were covered with blood, but before he could rebel against this outrage a tooth had been extracted, which was found firmly attached and resistant; a sound, healthy tooth had been taken out by mistake. The dentist then removed the loose tooth with slight inconvenience. The wound made by the extraction of the tooth did not heal, and the gums around it became swollen and inflamed; the remaining teeth on that side soon were loose and sore. In three weeks they were so troublesome that with his fingers he removed the first molar. He then noticed an opening into the antrum, and that granulations protruded.

About two months later the bicuspid was extracted in a similar manner, and, again, two weeks later, the cuspid. The entire side of the jaw became very painful; the patient was unable to sleep or take proper nourishment, and rapidly diminished in strength and

health, until at this time, February 3, he was extremely emaciated, not having taken solid food for weeks, and for the past three days only water, because of the great pain caused by the effort to swallow.

Examination revealed a deplorable condition of affairs; the entire half of the jaw and cheek was infiltrated. The microscope showed epithelioma. The characteristic cancerous odor prevailed. An incision was made anterior to the right cuspid and extended back across the soft palate to the condyle, down to the ramus, and forward along the buccal surface of the jaw to the cuspid, upward and forward, until all the mucous membrane to the median line was removed. The entire inclosed area was then resected, leaving only the external portion of the malar bone and the orbital ridge of the superior maxilla in position.

In operating, a portion of the anterior lobe of the parotid gland was removed, along with the duct; the hemorrhage was profuse, but was completely checked in a minute by hot water. The wound was dried, packed with aristol and gauze, no ligatures being employed. Time of operation, twenty minutes. The patient made a splendid recovery, slept comfortably much of that night, and had but slight rise of temperature. There was some edema of the face which lasted three days. Patient received nourishing diet, and was sitting up in three days. On the seventh day following the operation, the case was for the first time dressed, no untoward symptoms arising in the mean time. The packing was perfectly dried and scarcely blood-stained; not a drop of pus was present. The wound was re-packed loosely, and re-dressed every third day without a single complication. On February 17 the patient was dismissed from the hospital with instructions to douche the wound frequently. Progress in healing was rapid, and on the thirteenth day of March it had almost completely closed, leaving but a single opening into the antrum, so that on the thirtieth day of March the impression for an artificial denture was taken. The patient's health had wonderfully improved, he being free from pain and sleeping soundly. He was able to resume the management of his affairs, and was again in good health, continuing so until August, 1894, when he contracted pneumonia, from which he died. Two months prior to his death the cancerous granulations appeared in the old wound. There was no disfigurement of the face from the operation, and the only inconvenience was the loss of his natural teeth, as he was unable to wear the artificial substitute.

A lad thirteen years of age was brought to me in March, 1893, giving a history of complete nasal stenosis of some years' standing, a clear history of adenoids. He had been under medical care for years, the physicians failing to recognize the cause of his trouble. The discharge of pus from the mouth and nose caused the physician to refer the patient to a general surgeon, who, in turn, referred the case to me, with the statement of the parents that he believed the preservation of the jaws was preferable to their removal, which would result in a hideous disfigurement from an operation at his hands. I have never operated on a more lifeless and waxy-looking

creature. The odor from his breath and body, which was steeped in pus, was most sickening. There was no time to lose. Desperate chances had to be taken to save his life. All of the upper oral and bicuspid teeth were so loose that but for the periosteal attachment they would have dropped out. There were large sinuses under the lips and the roof of the mouth through which pus exuded. The periosteum of the roof of the mouth was so filled with pus that it bagged. All of the bone of the superior maxilla anterior to the first molar, including the palatal plate, was necrosed, likewise the palatal bones and the inferior turbinates. The adenoids completely filled the nares and crowded into the antrum of Highmore, breaking down the walls, and advanced until the process of destruction was complete.

Pus oozed from around all the loose teeth and through the sinuses, nose, mouth, and out up through the lachrymal ducts into the eyes. The throat was so plugged up that breathing was very difficult, and ptyalism extreme. At this operation I removed what I could of the adenoids, opening the nasal passage and partially cleaning the antra, which was done with great difficulty, as the boy took chloroform badly; owing to extreme anemia, the loss of blood was not so very great.

The loose teeth were held by ligatures until held by the new bone. The patient made a very good recovery from the operation, and in forty-eight hours the improvement was noticeable. The wounds were dressed daily, and, through the sinuses, douched every hour. Recovery was so rapid that in four weeks I was again able to operate, this time removing all of the necrosed bone and thoroughly curetting the antra.

The boy made rapid strides toward recovery, and by May 1 I was able to perform the final operation, when I removed the remaining adenoids. Here occurred a profuse hemorrhage, but with hydrogen dioxid and hot water it was quickly checked. Stimulating tonics and nourishing diet were prescribed from this on. Recovery was marvelous, so that in two weeks the patient was able to walk to my office for treatment. By June 1 he was dismissed cured, having gained forty pounds in weight, and gained his normal color, good appetite, and usual strength. He then went to his country home. I saw him again in one year. There was no occasion for treatment, with the exception of a slight imperfection in the alveolar process, where there had been a deep sinus, the gums did not unite and a few adenoids had put in an appearance. The only additional opening through which I operated was made where I extracted the left upper molar, this being so badly diseased I considered it well out, and through the opening I was better able to reach the antrum.

To facilitate cleansing of the wound and destruction of the pus, I have found electrozone the best of all agents for this purpose. Under its use the pus melts away like dew before the morning sun.

I have treated many cases similar to these stated, and without deformity in any instance. All of them are accompanied by blood-poisoning, and have usually been treated for rheumatism, malaria,

and typhoid fever for months and even years, before the error is discovered.

This conservative method is not conducive to a fine collection of pathological specimens, as a recovery of a part without blemish leaves only the history of the case and the statement of the patient as proof of the malady.

The student should have a chance to see in practice the methods he wishes to adopt. Why confine this work to so-called major operations, when they can be simplified to the minor class by annexing men skilled in dentistry and medicine alike to the medical faculty? It is only short of willful stubbornness in the controllers of such faculties upon which it reflects discredit.

As there were other papers to be read on the same subject, it was agreed that discussion should be postponed till they were read, and Dr. J. S. Marshall read a paper by VIDA A. LATHAM, M.D., D.D.S., F.R.M.S., of which we give an abstract, as follows:

FIVE CASES OF SARCOMA OF THE HEAD AND NECK.

Many times it falls to the lot of some practitioners to meet cases of mistaken diagnosis in dental surgery which become interesting studies. The question was asked, "Is the mistake altogether the fault of the graduate in dentistry, or due to insufficient opportunities?" In looking back, we find the training of a dental student decidedly deficient in many branches of study, just as is true of the medical man. Take, for example, the subject of oral surgery. The general type of teacher is often the instructor or assistant to the professor of surgery in the medical department (if the institution belongs to a university), a man who has seldom, if ever, done anything beyond the more common minor general operations, who knows little or nothing of the needs of the dental surgeon, and who often regards the dentist as not needing to know much beyond a few minor surgical subjects, as wounds, fractures, and dislocations. Indeed, he often looks down upon the dental profession, regarding it as nothing more than a mechanical business. I have often heard the criticism made by surgeons: "Of what use is an oral surgeon? No man who knows his profession would care to be so narrow." In fact, it is useless to urge the need of such a specialty at the present time. Luckily, it is the impetus given by the laity that demands a better training.

We all know that plastic surgery of any kind requires considerable thought and skill to prevent grave and serious deformities, and particularly is this so in the face, where, when disease takes place, it usually demands severe operations, involving considerable areas and dangerous localities. We all admit an oral surgeon must be a broad-minded, conscientious man, a profound and able diagnostician, and a graduate in medicine as well as in dentistry, for it is only by a combined knowledge that many of these cases can be treated successfully. It is men such as these who should be encouraged in their work, and asked to teach or operate in our dental colleges. Think for a moment how few are the colleges

that possess such a chair or teacher. To Philadelphia belongs the honor of showing how much good work was done by our revered and kindly teacher, the late Professor James E. Garretson. Only a year or so before his death, when visiting the city, did the doctor remark, "You little know the danger which arises from the indifferent training that is given in this line of work, and I do sincerely hope that before many years are gone the dental profession will demand the increased teaching of the subject, together with pathology and histology." It is a pleasure to see that the work of his late assistant is bearing out some of the doctor's ideas, and it is to be hoped that the profession will in every way encourage such scientific work. I have reference to Professor M. H. Cryer, whose studies in dental anatomy and on the maxillary bones are certainly of great anatomical and surgical value.

Let us recall the number of times we have casually noticed growths in the mouth and its adjacent parts. They may have appeared small and perfectly harmless, and we perhaps have thought it unnecessary to caution the patient to avoid all danger from uncleanliness, and irritation from rough stoppings or badly-fitting plates,—and in a short time have heard that the patient was suffering from a "tumor." I have seen and heard of these experiences often enough to make a vivid impression, and I am sure many others can tell the same experience. There is a fault in our schools which is the cause of many such errors of judgment. The student is taught prophylaxis in the abstract, but no theoretical teaching can impress the learner so forcibly as even one practical illustration. The feeling of danger or seeming hopelessness with which an advanced sarcoma or carcinoma of the maxillæ or face is met in the clinic, will not require emphasis in the student's mind as to prevention or early recognition. Every practitioner of dentistry at some time or other sees cases of just this nature, perhaps meeting the disease in its earliest form. If he is able to recognize it and sound a note of warning, even though he may prefer to refer the case to a surgeon or specialist, he has done a great favor to the patient, and has earned his gratitude.

Case No. 1. Myeloid Sarcoma of the Jaw.—Not long ago I saw a case which had been sent to a dentist for advice, regarding a right upper third molar that was troublesome. The patient was told to have the tooth removed, "as the wisdom-teeth were of no value," and this was accordingly done. But there was no advice or suggestion of anything suspicious about the thickening of the gum around the outer side of the tooth. After a few months the patient became a medical student, and, as the socket showed some irritability, a junior teacher and dentist in the University Dental School was consulted. He pronounced the growth nothing but "thickened gum," and it was snipped off and thrown into the cuspidor, and the place touched with a styptic and counter-irritant. In a little while it was thought to be recurring, but the dentist said, "No; it was all right;" and as he held a place in operative dentistry, and was quizmaster in the subject, the matter was left on his advice. Only a few months later the patient transferred to a different school, and happened to hear a lecture on the subject, the importance of which started a feeling of uneasiness. At this time I made the acquaintance of the student, who consulted me for examination and advice. Truly the growth was small, and seemingly innocent and fibroid in character; but the recurrence was suspicious, and I asked leave to watch the case for a short time. Finding that it grew larger, as proved by

measurement, I advised immediate and thorough operation, as I feared a sarcomatous epulis. On account of the position of the former dentist, and not wishing to seem to urge operation on a small matter, I suggested the consultation of an older and more experienced specialist than myself. After a little persuasion the patient consented to the removal of a small piece of tissue for examination, and I herewith present two photographs, chosen from a number of slides made from it. The first shows a rare section, normal to all appearance, glandular structure, and evidently the gland of Serres from the buccal cervical portion of the gum. Other slides from near this showed the ordinary histologic structure of the gum. The opposite end of the tissue, from the neighborhood of the periosteal surface, shows the early but rapidly-growing and malignant nature of the tissue. A typical myeloid or giant-celled sarcoma. In consequence of this examination the patient, who knew something of the danger of such a growth, was eager for a thorough radical operation, which was done by the consulting oral surgeon. At the present time, after the lapse of eighteen months, there has been no recurrence.

The great danger in this case lay in the fact that the growth first appeared behind and on the buccal surface of the gum near the third molar, and its easy course of progression would have been up the palatal process along the maxillary tuberosity and posterior palatine canal, so invading the antrum and palato-glossal folds.

It is generally believed that myeloid sarcomata are common in the maxillæ, though Bland Sutton says they are rare, and, as a rule, arise in connection with the nasal process. In the maxilla or mandible they arise from the body of the bone. Most text-books imply these myeloid growths are fairly frequent in the alveolar borders of the jaws; but this idea is due to the fact that we know very little regarding their origin in connection with developing teeth.

In regard to the classification of myeloid sarcomata, or, as Mr. Bland Sutton calls them, "myelomata," there has been some recent discussion. (See *Edinburgh Medical Journal*, February, 1897, illustrated.) Sutton thinks these growths have been confounded too long with the sarcomata, and agrees with Messrs. Butlin and Colby, in an article published in St. Bartholomew's Hospital Reports for 1895, on sarcoma of the femur and tibia. "If they are sarcomata, they differ from other forms in a manner which the modification of their structure does not suffice to explain." Mr. Sutton points out that they are only found growing from those parts of bones where red marrow exists, and that they grow from it, just as innocent cartilaginous tumors spring from the epiphyseal plate. They grow, in fact, from one of the normal constituents of the bone. His important conclusion, that they differ histologically, pathologically, and clinically from sarcomata, crystallizes the view which must have existed, though perhaps in a somewhat dormant condition, in the minds of many surgeons and pathologists.

There are two schools of practitioners, the conservative and the radical, and I am well aware both make mistakes. But knowing how patients are liable to postpone operative measures until too late, I take the position that it is best to follow the broad general rule,—"That wherever abnormal amount of tissue appears it should be thoroughly examined, and, if even suspicious, it should be re-

moved as soon as possible," whether it prove to be benign or malignant, for the following reasons:

(1) The excessive growth injures the normal tissues by abstraction of nourishment, causing atrophy in some other part.

(2) Atrophy produces *interference with function* of injured part.

(3) The irritation caused by the foreign growth is apt to excite *inflammation* in adjacent structures, the process stimulating the cells to a *hyperplasia*, which produces at least a deformity, or which may later become malignant.

(4) There is danger that patients will avoid operation until it is impossible to give relief, as active growth in oral neoplasms is the rule. The location of these tumors is dangerous on account of the great blood-supply, cavity formation occurring in the bones of the upper extremity, and because extension is easy to vital centers, as the brain and the eye.

(5) There is considerable danger of sepsis from infection by micro-organisms of the mouth.

Case 2. Small Spindle-celled Sarcoma of the Palate.—According to William Anderson, in Christopher Heath's Dictionary of Surgery, sarcoma of the palate is rare, and when it does occur is usually of the round-celled variety, but one instance reported by him being found to consist of fusiform or myeloid cells. In looking over the literature of the subject, I find few reports of primary tumors of the palate are recorded. I reported a few cases in the "World's Columbian Dental Congress Proceedings," and wish now to place on record a recent case of small spindle-celled sarcoma of the palate.

In this case the patient, a man aged thirty-three years, had been in perfect health up to six months previous to the time he came under my observation. What first attracted the patient's attention was a thickening on the left lingual surface of the palate. At first the patient was but little concerned, thinking it only a local irritation, but as it slowly increased in size he consulted a dentist, who told him it was a chronic inflammatory growth, and possibly due to his smoking a pipe. This habit was discontinued, and the swelling treated by counter-irritation, which gave no relief. By this time the place was a source of annoyance, as the patient could not keep his tongue off it, and he determined to have it removed by his family physician. The latter, upon examination of the growth, found that it extended from the first molar to the soft palate, within half an inch of the uvula, and becoming suspicious of its nature, he decided to be prepared for a radical operation, and gained his patient's consent to do what he deemed best. The growth was periosteal in origin, and was thoroughly extirpated, the teeth being extracted on that side and the alveolar border curetted, removing all tissue that looked dangerous or even suspicious. So far as is known, there has been no recurrence.

The differential diagnosis between palatal abscess and sarcoma shows the following points:

Sarcoma springing from the periosteum of the hard palate appears as a soft, semi-elastic, more or less rapidly-growing tumor affecting the roof of the mouth. A palatal abscess originating from any of the upper teeth and burrowing backward beneath the bone and periosteum, or in the soft tissues forming the roof of the mouth, gives rise to pain, and inflammation attends its development; it extends more rapidly, and gives an elastic feeling of fluctuation. There is the evidence of a carious tooth, and in chronic cases the diagnosis can be made positively by using exploratory puncture.

Case 3. Sarcoma of the Cheek.—Patient, G. B., a healthy-looking woman, aged forty-two, had detected, about three years before I saw her, a small, hard, but freely movable lump behind her left ear, between the mastoid process and lobule. It increased slowly and painlessly until about six months before I saw her, when it began to grow rapidly and to cause considerable distress. Upon examination, the tumor was of a reddish-blue color, the size of a small tomato, which it resembled in gross appearance. The overlying skin was extremely thin, almost translucent, and apparently incorporated with the growth, which itself was only slightly movable on the adjacent periosteum. It threw the ear forward, and from its lower border a hard ridge passed down behind the angle of the jaw and extended up in front of the ear, nearly to the level of the second upper molar tooth. The operation consisted of a circular and a longitudinal incision, part of the ear lobe being carried away with the tumor, which was adherent to the periosteum and to the sterno-mastoid muscle, part of the latter being necessarily removed. The ridge-like process, a large portion of the adjacent parotid gland, and some cervical lymphatic glands from the carotid sheath were also removed. The mastoid area from which the tumor was excised was treated with the thermo-cautery. Much misgiving was entertained as to the thoroughness of the removal, as, when the periosteum is considerably affected, the bone is almost always involved, and it was impossible to remove any more of the mastoid process and squamous bone. After some months, the disease recurred among some granulations which crept over the area of operation, and in spite of treatment by curetting, cautery, etc., the growth extended rapidly. The patient succumbed from pain and an exhausting discharge some nine months later, death occurring about four years from the beginning of the disease.

The origin of this tumor was a question, but I believe it originated in the lymphatic gland found on the mastoid process behind the ear. The patient had been subject to abscesses from badly-decaying teeth, and had received treatment and extraction. She gave a history of repeated attacks of lymphangitis, septic in all probability, and had complained to her dentist and physician regarding the stiffness of the jaw and neuralgic pain in the left ear. She was an intelligent woman, a clergyman's wife, and insisted that the doctors said the swelling (which was small when seen by them) was "only from her bad teeth," and would get well when her mouth was better. Removal of the diseased roots had at first checked the sepsis from which she was suffering, but the pain about the swelling continued, and her physician referred her to me, evidently thinking the neuralgia of dental origin. It is quite possible that this case might have resulted more successfully had it received early diagnosis and prompt treatment by operation. The photographs show the structure of a mixed sarcoma resembling alveolar, in parts showing masses of sebaceous epithelium and sweat-glands, and some hair-follicles, with the large sarcoma-cells grouped in masses. In parts a fibrous matrix runs among the cells, giving the appearance of alveoli.

Case 4. Sarcoma of Antrum.—The patient, a well-built boy of fifteen, had complained of constant pain in the upper left first molar, which was treated. In about three weeks his cheek began to swell, and on returning to the dentist the boy was told that the swelling was an abscess. Free incisions were made and no pus found. As he got no better and the pain continued, the patient left his dentist, going to one of the well-known advertising houses, and there was told to have the tooth extracted. This was done, and, after the somewhat profuse hemorrhage which followed, the pain was better. The swelling, however, did not disappear, and I saw the case upon

recommendation of his family physician, Dr. Lemaire. The unilateral bulging of the antrum and upward displacement of the eye, the slight amount of pain, together with the history and previous treatment, led to a diagnosis of sarcoma of rapid growth. I gave the patient an unfavorable prognosis, and urged a speedy removal of the upper jaw, which was done. When the soft parts were laid back the disease was found to be very extensive, requiring removal of the whole superior maxilla and malar bones, the zygoma and part of the temporal and masseter muscles. Hemorrhage was very severe, but was controlled by iodoform packing and tincture benzoin co. In spite of this bold and severe operation, the disease recurred, and the patient died from exhaustion.

The microscope showed the tumor to be a small round-celled sarcoma.

Case 5. Melanotic Sarcoma of the Neck.—This specimen is from the neck of a woman twenty-nine years old. It was situated at the angle of the jaw on the right side. The history is briefly, that she had a dark brown pigmented mole in the above location, which annoyed her so much that she frequently "picked" at it. About one year ago the mole seemed to be growing larger, but the patient was not alarmed until four months ago, when it commenced to increase in size very rapidly, to look inflamed, and to cause much shooting pain. Upon advice, the patient had the growth removed, which was done through an elliptical incision on each side at least one inch distant from the periphery of the growth.

As is well known, pathologists are undecided as to whether this is a sarcoma or a carcinoma, though undoubtedly we possess both varieties. Sections were made in celloidin, paraffin, and by freezing, the last two named giving the best results. The majority of the sections show the tissue cellular in type, of mixed sizes and shapes, some with and some without pigment-granules in the protoplasm, separated from each other by a variable amount of intercellular substance, showing in some places a distinct fibrillation. In some places the pigment-cells seem to invade the epidermis, as if the epithelium is implicated in the growth, which layer is in connection with the cellular elements, and then, further, gives way for the usual normal subcutaneous connective-tissue layer. The epithelium is not seen to be taking part in any of the growth, but here and there masses of sebaceous epithelium can be seen. The chief peculiarity of the growth is its superficial location and spread in a lateral direction.

The origin of the pigment is indefinite, the origin from blood being affirmed by Dressler, Kolaczek, and Rindfleisch, and denied by others.

Pigmented sarcoma-cells do not fibrillate, which fact explains the great malignancy of melanotic sarcoma. The fibroblastic part of such growth is always made up of spindle cells which are not pigmented. (Senn.)

Dr. Wm. Knight, of Cincinnati, Ohio, read a paper of which the following is an abstract:

Tumors of the Maxilla.

In this paper it is intended to briefly describe some of the more ordinary neoplasms of the maxillæ.

The upper as well as the lower maxillary bones, besides being subject to diseases affecting other bony structures of the body, are liable to the invasion of neoplasms peculiar and limited to themselves; among these may be mentioned the epulides, dentigerous and multilocular cystic tumors. The pathological congeners of the epulides may, however, be found in other parts of the body, but it is not customary to call every growth found arising from the gums, or from the periosteum of the alveoli, an epulis.

Two distinct forms of epulis, and only two forms, are to be recognized as affecting these bones. The recognition of these two distinct forms of epulis is of importance, not only from a pathological but mainly from a surgical standpoint, as deciding the proper treatment, which is different in the two affections. The hard or fibrous form is by far the most innocent in its pathological effects; it is almost identical with the fibrous growths found in other parts of the body, yet it differs from them mainly in its tendency to form spiculæ of bone in its construction.

The myeloid or softer form is composed of but a small amount of fibrous tissue, the rest of the neoplasm being largely composed of polynucleated myeloid cells; the first variety is closely connected with the gum, also with the periosteum of the alveolus; it springs from the inner or outer surface, and, unless of long standing and of large growth, seldom if ever invades the entire thickness of the alveolar process. The second form, or myeloid variety, is more closely allied to the endosteal than the periosteal structures, and is connected within the alveolus; it has a marked tendency to invade the entire thickness of the alveolar process; it does not attack the deeper portion of the bone unless improperly treated with irritants, when it may assume a malignant condition and quickly infiltrate the surrounding tissues.

The etiology of either form of epulis is somewhat obscure; both varieties have been observed before the eruption of the teeth of infants. It is, however, generally agreed that some prolonged dental irritation is the usual exciting cause of this affection, as instanced in the following case:

A lady aged forty-five was referred to me two years ago for treatment. She had worn for five years a lower dental plate that had caused her some annoyance, yet was unattended by any special pain.

On June 10, 1895, when I examined her mouth, there was seen a small growth the size of a hazel-nut, occupying the bicuspid region of the left lower jaw. She stated that the growth had been present for more than a year, but, to her great alarm, had enlarged considerably during the past few months. Having consented to an operation, the alveolar process from the lower lateral incisor to the first molar, down to and including a portion of the basilar part of the bone, was removed, when a fragment of the root of the second bicuspid was found imbedded in the bone. This fragment of a tooth had been, in all probability, the original cause of the formation of the tumor, which upon section proved to be a myeloid growth. Although the jaw was accidentally fractured toward the completion of the operation, no untoward symptom followed. At the present date, May 31, 1897, the patient is wearing a new lower plate. There is no evidence of any return of the disease.

In all instances in which the surgeon suspects a myeloid epulis, he should not rest content without removing the entire thickness

of the alveolar process. There is perhaps no more pitiful story in surgery than for a surgeon, when a case of the kind returns to him with a sarcoma occupying the seat of the former operation, with perhaps infiltration of the floor of the mouth, to declare that permanent relief is almost hopeless, and to think if, during the operation, more of the jaw had been removed this might not have happened. The essayist speaks from experience, and he hopes never again to make the same mistake. This was forcibly recalled to his mind in a recent case at the clinic of the Ohio Dental College:

The patient, a woman aged thirty-two years, had been operated upon by another surgeon nine months previously to her applying at the clinic. At that operation a small growth had been removed from her left upper bicuspid region. On examination, two growths were seen, one occupying the seat of the former operation, the other located in the right upper bicuspid region; both growths were evidently myeloid in character, and section proved this to be the case. It is by no means common to find this primary plurality of myeloid growth, and necessarily there is suspicion that in this case the disease is something more than a mere local one.

Assisted by Drs. Way, Locke, and Kumler, both growths were removed, and, although it is easy to prognose, the patient at the present time is better in spirits and health than she was, and there are no local manifestations of a return of the affection.

In the treatment of myeloid epulis, in consequence of the extensive involvement of the alveolar portion of the bone, even as in this case, when the growth apparently springs from one growth plate only, radical measures must be insisted upon. It is always the wiser plan to remove the entire thickness of the process, sacrificing whichever tooth it may be deemed necessary to effect a thorough removal of the disease. It is in these cases that imperfect operations are more than useless, for when imperfectly removed it is the unfortunate tendency of myeloid epulis to return in a still more malignant form. This fact is so well recognized that no operator in treating these cases should be satisfied unless he removes outlying tissue beyond the apparent extent of the growth. The best method to be employed for the purpose is to saw completely through the alveolar process on each side of the disease, and then, with one of the various forms of cross-cutting bone forceps, to remove the entire piece of bone with the tumor. It is my invariable practice, after having removed the affected piece of bone, to use the bone-gouge freely, so as far as possible to remove every vestige of the disease. The free hemorrhage which arises in these cases is easily controlled by pressing a few small pledgets of cotton into the wound; the hemorrhage having ceased, compresses of cotton, saturated with a weak boracic acid or potassium permanganate solution, can be gently pressed into the wound. These compresses are readily retained in position without much inconvenience to the patient, by his simply keeping his mouth closed; external bandaging is seldom required. Twenty-four hours having elapsed since the operation, the compresses may be removed, and the mouth should be rinsed four times a day with a solution of five grains of permanganate of potash to one ounce of water; in ordinary cases no other treatment is required.

In the fibrous or hard form of epulis it is seldom necessary to remove the entire thickness of the alveolar process, although it is advisable always to remove either the inner or outer plate upon which the growth is attached. It is prudent, in order to effect a limited destruction of the bone, to touch the site of the removed growth with the actual cautery; those who object to the use of the cautery can produce the same result by touching the part with nitric acid, zinc chlorid, or the trichloracetic acid. It is seldom necessary to sacrifice the teeth contiguous to the tumor, as the unremoved plate is sufficient to retain them in place, and in many instances, years after the operation, the teeth are found to be firm and in good condition.

Cystic diseases of the maxillary bones are, perhaps, more frequently due either to disease of fully developed teeth, or they are associated with teeth that have been imperfectly developed. The formation of cysts from either one of these two causes may attain to a very large size, giving rise to absorption to a greater or less extent of the walls of the maxillæ without in so doing giving rise to much inconvenience to the patient.

It is claimed by Broca, whose views on this subject meet with general recognition, that the great majority of cysts of the jaws have their origin in tooth-follicles. It is held that the soft gelatinous enamel-organ, being easily affected by morbid influences, readily disappears, leaving in the follicle a cavity which is ready to be transformed into a cyst. Some of these cases seem to arise without any appreciable cause; an instance of this kind was four years ago referred to me by Dr. F. Sage, of Cincinnati. The lady, forty-six years of age, had, occupying the right side of the lower jaw, a small cystic tumor in the bicuspid region. The tumor had been of slow but continuous growth; at no time during the development had pain been experienced. She sought medical counsel partly on account of the inconvenience of its increasing size, but mainly from the fear, that so often possesses the laity, that whenever a growth appears on any part of the body it must of necessity be a cancer. Careful inquiry into her history failed to elicit any fact that would give a clue to the cause of the trouble upon which an opinion might be founded. Both dentitions had been normal, and the teeth in the immediate neighborhood of the growth were in good condition. A careful search was made during the operation to discover any probable cause that might have produced a tumor, but none was found. Four years have passed since the operation, and there has been no return of the affection. Although the etiology of cystic tumors occurring in the jaw-bones has in recent years been elucidated to a very large extent, much still remains in doubt.

Mr. Christopher Heath, in his work on the "Diseases of the Jaws," has made particular mention of the views held by Mr. F. Eve,* as to the development of multilocular cystic tumors of the maxilla. Mr. Eve maintains that, so far from multilocular cystic

*Mr. Eve's paper, as originally published, is to be found in the *British Medical Journal* for January 6, 1883.

tumors having a dental origin, they are, on the contrary, produced by an ingrowth of the epithelium of the gum. This class of tumors frequently follows injury or irritation of decayed teeth, or long-continued inflammation, which has led to an increased supply of blood to the parts. They are slow of growth; they do not affect the lymphatic glands, nor infiltrate the surrounding parts.

These tumors are innocent in character, but, owing at times to their enormous increase and multiplicity, they not infrequently necessitate the removal of the larger portion of the lower jaw, which bone is specially liable to the disease.

The treatment of cystic tumors necessarily varies according to the form of the cyst; if it be a single cyst connected with the root of a tooth, the extraction of the offending body will usually be sufficient to effect a cure; if, however, it be of larger size and has caused some expansion of the bone, an incision through its bony wall will be necessary. This operation will evacuate the fluid, which is usually of a dark, clear color, unless inflammation has been present, in which event the contents will be of a more purulent character. It is also the best practice to cut away a good portion of the cyst-wall, as otherwise the cyst is likely to rapidly reform. In all instances in which a tooth is suspected of being present within a cyst, a careful search for it should be made, for it is obvious that resolution will be impossible so long as the tooth is retained. In both of the foregoing instances the after-treatment consists in simply using, four times a day, an antiseptic and slightly astringent mouth-wash. In these cases, where a portion of the wall of the cyst has been removed, the cavity should be plugged with boracic acid gauze, or lint that has been saturated with a solution of permanganate of potash. This packing might be removed and a fresh one used, if necessary, in forty-eight hours' time.

But in the treatment of multilocular cystic tumors more radical measures must be adopted. If any suspicion exists as to the possibility of a sarcomatous complication, which is not infrequently the case in this character of growth, the removal of the portion of the affected bone is always recommended, and has been the usual procedure. If, however, the diagnosis can be satisfactorily determined as to the absence of a malignant factor, the operation as recommended by Mr. Butcher, of Dublin, can be performed. This operation consists in dividing the mucous membrane covering the cyst, and then, with gouge and bone-forceps, or chisel and mallet, thoroughly removing all of the affected parts. The success of the operation depends entirely upon the completeness with which this is done. Mr. Butcher has had a very marked success with the cases of the multilocular cysts that he has treated by his method; other operators, however, have had only partial success by following the plan advocated by Mr. Butcher; their comparative failures may perhaps be attributed to their having left a portion of the diseased structure unremoved.

A malignant tumor composed of the same structural elements differs in its clinical history according as it attacks the soft or the

bony tissues, and differs also in bone as to whether the compact or cancellous tissue is involved; thus a round-celled sarcoma will not unfrequently develop within the interior of the lower jaw, and will give rise to no other symptom than, perhaps, enlargement of the bone. This condition may continue to exist for several years before the tumor has attained the size of a walnut, the patient during all this period complaining only of a small deformity, caused by the slowly growing enlargement. What a contrast this offers to the rapidly-growing sarcoma, as it occurs in the softer tissues. This difference of growth in the same structurally formed neoplasm may partly be explained by its elementary formation. All varieties of the sarcoma belong to the type of the embryonic connective tissue; the cells, of which they are mainly composed, have no definite arrangement; they are in constant relation with the stroma, and consequently the cell not being surrounded by alveoli, as is the case with the carcinomata, have a marked tendency to infiltrate the neighboring tissues at a very early period. The blood-vessels of a sarcoma ramify among the cells, and are very thin-walled, hence the frequent occurrence of hemorrhage into their substance and their rapid dissemination through the vascular, and not the lymphatic system of vessels.

The compact tissue of bone antagonizes to a marked degree the favorable conditions for sarcomatous growth; this is especially the case when a sarcoma develops between two plates of bone, as when a neoplasm of this character forms in the interior of the lower jaw. Occupying an intermediary position, clinically speaking, between the rapidly-growing sarcoma of the soft parts and those slow-growing ones occurring in the lower jaw, are those instances of sarcoma originating in the connective tissue of the mucous membrane lining the antrum of Highmore; this is by no means an uncommon location for the development of primary sarcoma; the histories of all such cases are very similar. The sufferer complains of pain which is often referred to a tooth contained in the affected jaw; the offending member is sometimes treated, but more frequently it is extracted. The relief, if any, afforded by these means is but temporary; the uneasiness and pain continue, with perhaps some intermission; this condition may, and usually does, continue for a considerable time before any swelling of the part is observed. After the swelling appears the disease is apt to increase rapidly, and the growth, which by this time has completely filled the antrum and has infiltrated the bony walls of the cavity, has a tendency to fungate and to bleed readily. A case of this kind was referred to me by Dr. F. Saul:

The sufferer was a man forty-two years of age. For two years past he had intermittent pain in the upper second bicuspid; although the tooth was in sound condition he had it extracted, yet without obtaining any relief. Two months subsequently, when he came to me, a slight swelling appeared on the right cheek, and a suspicious-looking growth in the alveolus of the extracted tooth. He stated that he had some pain almost all the time, which now and then was severe. He was advised to have the right maxilla removed; to this, however, he dissented. Five months subsequently he returned, the swelling now extending upward under the zygoma, and reaching the temporal region. To operate with hope of permanent relief

under such conditions being extremely doubtful, he was so informed, as he was now very eager to have the operation performed. The upper right half of the maxillary bone was removed, together with considerable of the surrounding tissue. The tumor proved to be a round-celled sarcoma. Seven months after, the disease returned and a second operation was performed. This for a few months gave him relief, after which time hemorrhage ensued, which, occurring periodically, terminated in death.

To a certain extent, this case illustrates the clinical history of sarcoma when originating in the antrum. Intermittency of growth at first, which is somewhat characteristic of sarcoma wherever it occurs. This was followed by slow but continuous enlargement, and finally, after the bony walls of the antrum had yielded, by a rapid increase in growth, with infiltration of all the surrounding parts. The treatment of sarcoma must be radical; any contemplated operation should be done as early as a diagnosis can be made. As long as a sarcoma is confined within the bony walls of the antrum a hopeful result as to a permanent cure can be looked for, but after the disease has passed beyond these confines any operation, however heroic it may be, will result usually in failure, as it is almost impossible to remove all of the affected tissues. As for myself, I always refuse to operate in advanced cases of sarcoma of the upper jaw without informing the patient or his friends of a probability of the return of the disease, and agreeing to operate simply as a means of relieving temporarily the suffering of the person so affected.

(To be continued.)

Union Meeting of the Maryland State Dental Association, Washington City Dental Society, and Virginia State Dental Association.

(Continued from page 577.)

Second Day—*Morning Session* (Continued).

Dr. Clarence J. Grieves, of Baltimore, read the following paper:

Removable Plate-Bridge, Vulcanite Base.

It is my pleasure to report two cases which have been in constant use three years.

Recognizing that there is little which is new in their construction, but rather the application of a few established dental principles, these dentures are submitted on account of what they have accomplished as well as what they promise for the future.

These bridge-plates derive their support from normally healthy alveolar ridges, and are stayed in position by the attachment of telescoping crowns, common to all removable bridge-work.

The first case presents well-preserved left central and lateral superior incisors, the roots of the right central and cuspid being in position. Much absorption and hardening of the muco-periosteum and the low attachments of the surrounding muscles made

several plates (gold, aluminum, and vulcanite bases), covering the palatal portion of the mouth, almost if not entirely useless. Added to these difficulties was a well-marked nausea on contact of any plate with the palate.

The inferior maxilla retained the four incisors, the centrals of which were much abraded; cuspids sound, and the right second bicuspid missing; a healthy root of the right first molar and the left bicuspid in position.

The long-since missing molars and a very decided protrusion of the inferior maxilla had produced a deep abrasion of the front teeth.

The inferior was completed by an extension bridge to supply the missing bicuspid on the right, and a similar bridge supplied the deficiency of the first molar on the left. The remaining root of the molar on right, being healthy and possessing the appearance of having done duty for years, was transformed into a bicuspid by a gold collar-crown. The occlusal surface thus furnished being good, it was deemed unwise to annoy the patient by supplying a partial lower denture.

The superior right central and cuspid roots were sterilized, their apices sealed with cement which was carried down the root-canal, and into which were introduced while hardening two "bright-metal screw-posts," to project slightly beyond the root-walls at the cervix; around these posts, and well anchored into the roots, amalgam was adapted to the contours.

After the hardening of the amalgam, these roots were dressed and trimmed to receive cylindrical caps of platinized gold, 30 gauge. The walls of these caps were made parallel. They were made to fit to a driven joint well under gingival margins, and were set in place temporarily with gutta-percha.

These *primary caps* in their respective positions were fitted by bands of platinized gold, 28 gauge, thus forming *secondary caps*, accurately telescoping. These secondary caps were trimmed to fall a little short at their cervical edges of the gingival margins, and this was further insured by the actual contact of the top of the secondary cap with that of the primary cap.

Occlusal surface being sought rather than appearances, the idea of porcelain fronts for these crowns was discarded. The central cap was converted into an all-gold crown with a heavy incisive edge, and the cuspid into a bicuspid by the addition of cusps. The lip being full and well-bearded, concealed the gold.

These secondary crowns were placed in the mouth, removed in a plaster impression, from which was obtained a sand-and-plaster cast showing the crowns in their relative positions. They were then united at the palato-cervical margins by soldering, from cap to cap, a piece of platinized gold, 25 gauge; this plate stood slightly away from the membranes and, being quite as wide as the caps with extension pieces over the ridges, was perforated to allow free passage for the vulcanite.

The piece being finished and placed in the mouth, was removed in a plaster impression, from which was obtained a plaster cast.

On this cast plain teeth were adapted to the ridge and bite, and the whole piece vulcanized into position.

The bridge-plate now complete and the inner surface of the caps on plate, "glyceroled," the primary caps were removed from the roots, cleansed, filled with cement, placed in their respective positions in the caps on the plate, and the whole piece pressed into place in the mouth. The cement was allowed to harden, after which the plate was removed, the glycerol preventing the attaching of both sets of caps.

The case as then ready for use, presented a bridge-plate readily removed by the patient and entirely free from the complicated detail so usual in removable bridge-work.

The second case to which I would direct your attention presents the four incisors in position, which, with a left cuspid root and a sound left third molar, complete the teeth in the upper maxilla.

In the lower maxilla all the molars were missing except the right second molar, which, being carious, was treated, filled, and capped with gold collar-crown. The deficiencies below were supplied by the use of a gold clasp-plate bearing two molars on the left side and one on the right.

A telescoping molar cap-crown, similar to the bicuspid mentioned in the first case, was constructed for the remaining molar in the superior maxilla.

The cuspid root was sterilized, the apex sealed, and it was dressed to receive a well-adapted band of platinized gold, 30 gauge, which band was converted into a cap by "topping" in platinum and iridium plate.

This *primary* cap being held in position on the root with gutta-percha, a second telescoping cap was formed, carrying at its center a square platinum and iridium split pin; this pin being carefully fitted into a tube formed from very thin platinum and iridium plate, and reinforced by solder on its outer surfaces.

The primary cap was now removed from the root, the root-canal enlarged, the cap slipped back into position and perforated through its top to receive the tube. The tube was forced into position in the root by using the pin on the secondary cap as a carrier. Both caps, with the parts in their relative positions, were removed from the root, the secondary or pin-cap carefully removed from the primary or tube-cap, and the tube soldered into place.

The primary cap was then finished and held in place on the root temporarily by gutta-percha.

The secondary cap or "pin-portion" being placed in its position over the primary cap on the root, a suitable cuspid facing, properly ground and backed in pure gold, was attached in the mouth with wax. The whole being now removed, the crown was invested and soldered, producing a removable porcelain-faced collar-crown.

The secondary molar cap and cuspid crown were returned to the mouth and removed in a plaster impression, from which a sand-and-plaster cast was obtained.

These crowns were then joined on this cast by soldering a heavy flattened platinum and iridium bar at their palato-cervical aspects,

the bar passing back of the incisors and well around over the ridge to the tuberosity on the right side, where the molars and bicuspids were missing.

The completed piece was then polished, once more returned to position in the mouth, and removed in a plaster impression, from which a plaster cast was gained, and gum sections being ground to bite, the whole piece vulcanized, leaving but little vulcanite back of incisors.

The primary caps were set in the mouth in this case, as in the first case, by using the plate when finished as a carrier, thus insuring accuracy in traveling of the parallel caps.

In concluding I would note the following:

(1) In those cases where fixed bridge-work is impossible, the remaining healthy roots and teeth, as supports to a denture covering the alveolar ridges only, could be used. Then these retaining roots and teeth being carefully capped and covered by removable crowns, these crowns are allowed sufficient freedom of motion to throw the stress of the bite on the ridges and act only as a balance to the denture.

(2) The condition of the membranes in these cases is normal, and far superior to the congested state found under the average denture, no matter what the base. Being easily removed by the patient, the muco-periosteum is notably free from the gum hypertrophy so frequent in attached bridges.

(3) The judicious use of vulcanite, supported by a metal frame, with the advantages of lightness and rigidity, perfect adaptation, and simplicity of construction.

Discussion.

Dr. C. L. Steel, of Richmond, Va., said in the case where Dr. Schloendorn had put a removable plate to retain the loose bridge, he thought it would have been better practice to have removed the loose teeth and inserted a complete set upon a plate.

Dr. Marshall Smith, of Baltimore, thought the papers were both admirable, and that they did not invite criticism. The making of bridge-work was often a very great advantage over plate-work, and those who were working to perfect the methods in this branch of dentistry were placing the profession under an obligation. He had seen bridges made by Dr. Büttner, who was formerly of Baltimore, very similar to those shown by Dr. Schloendorn, which had been in service for over ten years and were still doing good work. It is beautiful, and shows what careful and worthy work dentists can do for their patients by this method. His experience proved to him that bridge-work would often tighten and preserve the teeth upon which it was placed.

Dr. Thomas Fillebrown, of Boston, Mass., said, in regard to bridge-work, he thought that a dentist could generally do better by following out one plan, and he had confined himself to the permanent bridge, and when he put one in a mouth he put it there to stay. When a bridge is so made that the surfaces will be self-cleaning, there seems to be no need for it to be removable. It is

true that bridge-work will often improve the teeth upon which it is placed.

When this method of supplying lost teeth was first introduced, there were many who condemned the whole subject of bridge-work as being decidedly inferior and less desirable than plate-work, but the consensus of opinion now seems to be that in many cases it is desirable. In many failures the cause has been too great dependence on the restorative power of the bridge on the loose teeth. The dressing-down of the tooth, the removal of the enamel and uncovering the tubuli, together with the necessary treatment, will often affect the life of the tooth, and it will sometimes be necessary to remove the bridge, take out the pulp, fill the canal, and replace the tooth.

Dr. Fillebrown, while he was on his feet, said there was one subject on which he felt he should speak, and that was the National Dental Museum at Washington. He said that this museum, situated as it was at the capital of the nation and under the generous care of the government, would accomplish an amount of good to the profession in the future that was absolutely beyond our conception at present, but that it was our privilege as dentists to-day to use the museum, and they should consider it a privilege to contribute to its shelves such abnormalities of growths or casts of jaws or other material as would be of interest. There is an appropriation from the government which puts the museum in a position to buy such specimens if they are thought to be worthy. He hoped that every dentist would bear the claims of this museum in his mind and do what he could for it, and make such use of its resources as he had opportunity and need.

Dr. L. M. Cowardin, of Richmond, Va., said bridge-work is very beautiful work, but that we must not get an idea that placing a bridge upon an affected tooth was adequate treatment for Riggs's disease. It will not tighten this class of teeth, except temporarily, by the treatment needed to get them into condition to receive the bridge. When he has a patient with teeth loosened from alveolar trouble he advises against bridge-work, but when teeth become loose because of a lack of support from their neighbors we may expect them to become firm if a bridge is so adjusted as to hold them solidly in place.

Dr. E. P. Beadles, of Danville, said there were dangers in bridge-work. He was confident that he had killed one man by furnishing him with two hundred and fifty dollars' worth of bridge-work. The man in question was addicted to the free use of alcoholic stimulants, and was a great gormandizer. While the preparation for the work of his mouth was going on he insisted upon using spirits to enable him to endure the pain, and was so successful that the next day he had no recollection of the operation. However, the new appliance gave him so much pleasure in eating that he commenced a course of gormandizing which, in less than a month, put him in his grave.

Dr. T. S. Waters, of Baltimore, spoke of the process of fastening the abutments of a bridge to the roots of teeth by cementing

cylinders in the canals and fastening the bridge on with split pins in the cylinders, to which were soldered caps which were swaged over the crowns of the teeth. In the construction of bridges his aim is to make the bridge so the mouth will be kept in as hygienic a condition as possible, and he uses the alveolar process as a support for the bridge. In doing this, allowance must be made for the shrinkage of the gums.

A patient who wished him to make a bridge was advised to have a plate instead, but went to another city and had a bridge inserted, which irritated his mouth to such a degree that it produced cancer and caused the death of the patient.

Dr. D. D. SMITH, of Philadelphia, said that there were no two cases of bridge-work that were just alike. Every case requires special thought, and he only would succeed with this delicate process who could study the conditions and adapt the work exactly to each case. He had never seen more beautiful work than the cases shown here to-day, but the main consideration is not, Can the dentist make a beautiful piece of mechanical work? but it is rather the propriety, the advisability, and the adaptability of crown- and bridge-work to individual cases. This is much more important than the mechanical construction of a particular bridge. The knowledge required to put the mouth in condition to support a bridge is far more important than the skillful building of the bridge itself. We see cases where the appliance is badly constructed, but does good service because they have built upon good foundations, and other cases where the construction is good, but the foundations are bad, and the work proves a failure. It depends upon the way the teeth are treated whether the bridge will tighten or loosen the foundation.

Is it ever proper to sacrifice one or more good teeth to get in a piece of bridge-work? Such questions must be studied. Some years ago, he thought in 1881, he had advocated cutting off sound teeth, under certain circumstances, to support a piece of bridge-work, and had said that the pulp was not of prime necessity *after a certain age.* This met with a great deal of opposition at that time, but we all, or most of us, feel now that this is true. In fact, it is generally conceded that a tooth will sometimes be as well off without a pulp as with it; there are cases where the usefulness of a tooth can be enhanced by destroying the pulp. He would like to have such questions discussed.

Dr. THOMAS FILLEBROWN said he could scarcely let the statement go unchallenged that a pulpless tooth was as good as a live tooth, but would admit that under certain conditions a pulpless tooth would give as good service as if it were living.

Dr. L. M. COWARDIN said that Dr. Beadles alluded to the fact that he thought he had brought about the death of a patient indirectly by inserting a piece of bridge-work. He had in his mind two gentlemen for whom he had done work; one of them was taken sick after he had inserted a bridge in his upper jaw, and while he was preparing the lower teeth to support another one. The patient died of meningitis within a few days. The other gentle-

man died within three months of the completion of an upper bridge. He felt that perhaps he was responsible for the death of both patients. The work may prove too great a strain on the nervous forces of a patient, and the exhaustion directly or indirectly fatal.

Dr. A. W. LAKIN, of Boonsboro, Md., had not the unbounded confidence in bridge-work that many had, and, besides, people are not able to afford the price that must be paid for such work. He had in his office a gold plate that was made as class work in college, which lasted and did good service for thirty-five years. This cost much less than the same number of teeth would on a bridge, which would not have done near as long service.

We must consider the cost, and this consideration will teach us that it is only the few who can afford to have such work done. It is in advance of the ability and willingness of the patients to pay for such expensive work.

Dr. C. L. GRINDELL thought that the comfort and convenience of bridge-work to the wearer were so much greater than of plates that many would always be willing to pay the price on this account. He spoke of a patient of his who, having lost his plate at the seashore, had a piece of bridge-work substituted for it, and always after expressed himself as being glad of the loss that led him to have the more comfortable denture.

The discussion closed, and the convention adjourned to meet at 8 P.M.

(To be continued.)

A VOLUNTARY STATEMENT BY DR. JOSEPH HEAD,

WHICH WAS ACCEPTED BY THE PENNSYLVANIA STATE DENTAL SOCIETY, JULY, 1897.

INASMUCH as I sincerely regret that the issuing of the pamphlet reporting the action of the Odontological Society should have caused unjust suspicion to fall upon any one, and inasmuch as reprints of such action, which I in accordance with my duty as editor furnished to a member upon request, have been mailed, without the knowledge of the Odontological Society, to many members of our profession, causing by their incomplete evidence grave injustice to three respected gentlemen, it will be my pleasure and duty when I return to Philadelphia to see that a complete retraction is made and forwarded to each person who received a copy of the aforesaid pamphlet; and furthermore, in the August number of the DENTAL COSMOS and *International Dental Journal* I will see that this statement is inserted.

(Signed) JOSEPH HEAD,
Editor of the Odontological Society.

DENTAL COLLEGE COMMENCEMENTS.

WESTERN RESERVE UNIVERSITY—DENTAL DEPARTMENT.

THE annual commencement exercises of Western Reserve University were held in Association Hall, Cleveland, Ohio, May 17, 1897.

Rev. Livingston Taylor delivered an address entitled "Home Thrusts."

President Charles F. Thwing, D.D., conferred the degree of D.D.S. upon the following graduates:

Fred S. Anderson.
Lyman S. Armstrong.
Clayton R. Baldwin.
Morley J. Beal.
William L. Beal.
Carl F. Blair.
William D. Bolton.
Luther L. Bosworth.
Clarence W. Davis.
William R. Dixon.
Dexter H. Fairbanks.
Charles A. Fink.
Ellason F. Grose.
Arthur La F. Higgins.
William C. Honeywell.
Harry M. King, A.B.
Fred L. Ludwick.
William M. Megginson.
Frederick La V. Miles.
Frank A. Moran.
Martin H. Morrison.
John A. Osborne.
Reuben W. Parker.
Aubrey L. Parsons.
M. C. Ramaley.
William F. Spargar.
William J. Stephan.
Walter P. Smith.
Burt E. Saunders.
Charles F. Wallace.
Frank L. West.

UNIVERSITY OF MICHIGAN—DENTAL DEPARTMENT.

THE annual commencement exercises of the College of Dental Surgery of the University of Michigan were held, in connection with those of the other departments of the university, at Ann Arbor, Mich., on Thursday, July 1, 1897.

The commencement oration was delivered by Andrew S. Draper, LL.D.

The degree of D.D.S. was conferred on the following graduates:

William H. Baker.
Elmer I. Beistle.
James C. Blair.
June A. Burr.
Herbert T. Cummings.
Thomas E. Carmody.
Guy H. Dennis.
Albert J. DuBois.
Arthur B. Dutch.
George D. Edgar.
Henry C. Fiebig.
Frank R. Fletcher.
John E. Graham.
Selwyn S. Greeley.
Albert B. Green.
Grant S. Hadley.
Louis R. Hoelzle.
Harry S. Holmes.
Samuel W. Honey.
Fred. H. Hood.
Frank W. Howlett.
Samuel W. Hussey.
Wendell H. Johnson.
Frederick W. Joslin.
Frederick J. Klein.
Gustavus E. Kuhl.
Frank D. Loomis.
Kennith McKay.
Frank T. McNamara.
Roland S. Mitchell.
Blaine B. Pettit.
William R. Purmort.
Carlos W. Putt.
Oloff W. Randall.
Albert J. Reed.
Dessie B. Robertson.
John M. Rosenthal.
Samuel K. Scharlott.
Arthur W. Schurtz.
Charles E. Sheldon.
Charles L. Sitzer.
Luman R. Slawson.
Charles C. Stone.
Delmer W. Stoup.
Edward L. Vaile.
James N. Vodrey, Jr.
Harry D. Watson.
Albert J. Wildanger.
Albert J. Wolfert.

PHILADELPHIA DENTAL COLLEGE.

AT a commencement of the Philadelphia Dental College, held June 1, 1897, in the college building, the following were graduated: Wm. L. Bollens, New York; Harold M. Miller, Canada; Samuel E. Slegel, Pennsylvania.

New York College of Dentistry.

The thirty-first annual commencement exercises of the New York College of Dentistry were held in Chickering Hall, New York City, on Thursday evening, June 3, 1897.

The address to the graduates was delivered by Rev. Lindsay Parker, D.D., and the valedictory address by Arthur L. Douglass, of the graduating class.

The degree of D.D.S. was conferred on the following graduates by Rev. George Alexander, D.D., president of the board of trustees:

Elbridge Alfred.
Everest J. Allen.
James H. Arbuckle.
William Arkin.
Henry Bade, Jr.
Thomas P. Barnes.
Sanford J. Bartlett, Jr.
Edward G. Bauman.
William H. Beach.
Allen B. Benham.
Ernest A. Bennett.
Alexander E. Black.
Adolph Bleyer.
Newton A. Bornstein.
Frederick V. Bradley.
Frank E. Buckley.
Frank S. Conkling.
Walter H. Cummings.
Alexander W. Currie.
Leopold Dolz.
Arthur L. Douglass.
Charles R. Enos.
Arthur P. Faass.
Edward S. Folley.
William B. Force.
Jerome Frank, B.S.
Zenas P. Fuller.
Horace M. Grossman.
Henry S. Haskell.
Arthur W. Herman.
Heyw'd H. Heywood.
Geo. W. Hindmarsh.
Warren S. Holder.
Howard C. Houston.
Thomas J. Howard.
Frank B. Hoyt.
Arthur Ihl.
Oskar Ihl.
Charles E. Kelley.
David Kreisler.
Harry Lessem.
Fred'k W. Levenson.
Leon I. Levien.
Joseph Levitch.
Louis Lifshutz.
Welford Van D. Lyon.
Julio E. Lyon, B.S.
Baruch B. Marco.
Samuel G. Mayo, Jr.
Ev'nd'r T. McWilliams
Nathaniel K. Mead.
George L. Moffat.
David A. Morton.
Charles R. Motak.
Genaro Perez, Jr., B.S.
Alfred R. Perrin.
Albert D. Pentz, Jr.
John K. Powell, Jr.
Peter P. Raichl, Jr.
Thos. H. Reynolds, Jr.
Regin'd H. Sanderson
A. Santamaria, M.D.
Harry Schwartz.
Samuel A. Scranton.
Harry M. Semans.
George C. Sharp.
Walter T. Shepard.
Frank B. Soden.
Herbert W. Spencer.
Carl Stahl.
Ward E. Stevens.
John J. Sweeney.
Edward T. Taylor.
Ural S. Traub.
Edwin B. Tripp.
Alfred S. Walker.
Alfred Warne.
Louis F. Weitzman.
Edwin A. Westervelt.
Paul D. Wilson.
Francis Woodruff.
Oscar J. Yule.

Tacoma College of Dental Surgery.

The annual commencement exercises of the Tacoma College of Dental Surgery were held in Chickering Hall, Tacoma, Wash., on Saturday evening, April 3, 1897.

The faculty address was delivered by J. W. Hickman, M.D., and the valedictory by E. J. Fisher, of the graduating class.

The degree of D.D.S. was conferred on the following graduates by J. R. Yocum, A.B., M.D., president of the college: Ernest J. Fisher, Alpho H. Gundlach, Frederick J. Geoghegan, of Washington; George B. Doerrer, of California.

University of California—College of Dentistry.

The annual commencement exercises of the College of Dentistry, University of California, were held in Odd Fellows Hall, San Francisco, Cal., on Wednesday evening, June 16, 1897.

The faculty address was delivered by Allen H. Suggett, B.S., D.D.S.

The degree of D.D.S. was conferred on the following graduates by Martin Kellogg, A.M., LL.D., president of the university:

Julian W. Ashley.
Benjamin A. Bosqui.
Edwin A. Clay.
Charles A. Coffin.
Orville M. Colburn.
Asa W. Collins.
Medora V. Croall.
Stephen R. Cushing.
George S. Donnelley.
Judge H. Durham.
Edward S. Fiske.
Howard W. French.
Ray E. Gilson.
Herman P. Hanson.
Frederick W. Harnden.
William M. Herrington.
Theodore S. Higgins.
William R. Holladay.
Walter R. Hughes.
Charles F. H. Jarvis.
Frank D. Johnson.
Paul C. Jones.
Edmund D. Keefe.
Louis J. Kerwin.
Clair C. Marckres.
Charles J. McCarthy.
Milton McMurry.
Julius I. Morris.
James A. Plunkett.
Thomas H. Quirk.
George W. Raymond.
Harry C. Reynolds.
Frank O. Robinson.
Helen M. Rulison.
Edward W. Russell.
Fannie E. Scott.
Edwin M. Stealey.
Henry Stiles.
Charles M. Sumner.
George H. Tompkins.
Edward A. Upton.
Martin Wachs.
Thomas R. Wheeler.

DENTAL SOCIETY ANNOUNCEMENTS.

Northern Iowa Dental Society.

The third annual meeting of the Northern Iowa Dental Society will be held at Mason City, Iowa, September 7, 8, 9, 1897. Arrangements already made indicate an interesting and profitable meeting. A cordial invitation is extended to all members of the profession to meet with us.

Wm. H. Steele, *Sec.*

Bi-State Dental Meeting in Michigan.

The bi-state dental meeting of the Southwestern Michigan and Northern Indiana Dental Societies will be held at Benton Harbor, Mich., on Tuesday and Wednesday, September 14 and 15, 1897.

F. H. Essig, *Secretary Southwestern Michigan.*

EDITORIAL.

The New Dental Law of Pennsylvania.

In the July issue of this journal for 1894, we called attention to the deficiencies of the laws of Pennsylvania regulating the practice of dentistry in this commonwealth. Not only were these deficiencies glaring and fundamental, but in the attempt to eliminate them no less than three acts of Legislature were passed bearing upon the subject,—viz, the law of 1876, that of 1883, and the supplement thereto, passed in 1893. The repealing clause of the latter was not specific, and, as a consequence, the whole matter of dental legislation in Pennsylvania was left in an inchoate and very unsatisfactory condition.

The analogous problem of regulation of medical and surgical practice in Pennsylvania had been satisfactorily solved by the pas-

sage of the Medical Examiners' act of May 18, 1893, and furnished not only an admirable pattern for similar dental legislation, but by establishing a precedent rendered the securing of such legislation less difficult.

An examination of the dental law of Pennsylvania approved July 9, 1897, which appears elsewhere in this issue, will be of interest in that it involves several novel features and overcomes certain serious difficulties which are more or less prevalent in all of the dental laws of the United States. In the first place, the new law creates a Dental Council, consisting of two state officials and the president for the time being of the Pennsylvania State Dental Society, the function of said council being to supervise the work of the Board of Dental Examiners, for the purpose of securing the conduct of the licensing examination in harmony with the provisions of the act. A council so created and charged with a supervisory function as stated cannot fail to act as a wholesome protection against errors upon the part of the Board of Examiners.

The method of appointment of the Board of Examiners is worthy of consideration. It will be seen that the board consists of six members, who are appointed by the Governor from a list of twelve nominees chosen by ballot from the members in good standing of the State Dental Society. This is an arrangement which practically excludes the possibility of political preferment in the final appointment of examiners, while at the same time it is a fair and just concession to the appointing power of the Chief Executive of the state. The specifications as to the character and standing of the nominees of the State Society are a sufficient safeguard for securing the appointment of a proper board. The importance of a safeguard of this character will at once be evident from a perusal of the open letter of Dr. McManus in this issue, setting forth the difficulty which has arisen from a political exercise of the appointing power in Connecticut. We are informed that a similar state of affairs has arisen recently in Illinois. The removal of incompetent or irregular members of the board is made mandatory.

The specifications as to the character of the examination and method of conducting it are full and explicit, and are such as to absolutely prevent any injustice or partiality in the licensing examination. The whole result of the examination in all of its details for each candidate is made a matter of official record, open to the inspection of any party in interest for a period of five years. The matter of state examination by an autocratic board is thus done away with, and the work is lifted beyond the possibility of suspicion as to the question of its unfairness, and in large degree as

to its imperfect character; for, if faults appear, a means is provided for their correction. The state board examinations in a great many instances heretofore have been carried out not in the interests of the candidate nor with a proper appreciation of his rights; while the board may have been of unquestionable integrity, the law under which it exercised its function gave the applicant for license no right of appeal from its findings. The decision of the board was final; each was in itself a court of last appeal, and the applicant was accorded no redress, even though his failure were due to the inexperience, ignorance, or other defect of the whole board or one or more of its members. In the Pennsylvania law the rights of the applicant are the main consideration, and the examination is hedged about by all the safeguards to insure his fair treatment.

The character of the examination is as high as should at present be required. The subjects embraced are all those which are taught under the present standard of the National Association of Dental Faculties, and any man creditably passing an examination based upon such a standard may be fairly adjudged competent to practice dentistry.

An important feature of the new law is the interstate comity clause, by which the licensees of other states having a standard substantially the same as that of Pennsylvania will be granted a license without examination. This is a step in the direction of uniformity of dental legislation throughout the states upon a high plane, and the only practical method by which such uniformity can be attained.

It is noteworthy that the Pennsylvania law creates its own standard of educational fitness; it does not delegate its rights and powers to any other body, and is therefore not hampered by the unconstitutional rulings of the National Association of Dental Examiners. With reference to this point, the following resolution was passed at the recent annual meeting of the Pennsylvania State Dental Society, held at Glen Summit:

"*Resolved*, That in the event of Senate bill 179 [the new dental law] becoming a law by Executive approval, the State Board of Dental Examiners of Pennsylvania be and is hereby instructed to take cognizance of the fact that their powers and duties are specifically laid down by said act, and that therefore the representation of the State Board of Dental Examiners of Pennsylvania in the National Board of Dental Examiners is conditioned upon the recognition by said National Board of Dental Examiners of the unrestricted and free right of the State Board of Dental Examiners of Pennsylvania in the exercise of their duties, rights, and powers as defined by said act of Legislature of the state of Pennsylvania under which said State Board of Dental Examiners is created."

The intent and purpose of the foregoing resolution was to emphasize the fact of the legal supremacy of the state in its right to jurisdiction in these matters; and while it does not *per se* prohibit representation of the Pennsylvania State Board in the National Board of Examiners, it makes a recognition of the rights of the State Board a condition of such representation, and prevents interference by the National Board or any other body or board in the management of the affairs of the Pennsylvania State Board. We commend the new law of Pennsylvania as worthy of careful study by all who are interested in the important question of dental legislation.

The "Wicked Partner" in Dental Journalism.

Some of our esteemed contemporaries, squirming under the lash of castigation, are vociferating, like the boy who is spanked, "I didn't do it, indeed I didn't,—it was our Johnny." The next time they catch their breath the air is plaintive with promises to "be good" and not offend again.

These gentlemen are now annexing the idea that while there may be no sin unless you are found out, if the sin does find you out, as we are promised it will, the righteous punishment hurts.

It may be charitable to suppose that the poor victims "didn't know it was loaded." They may have thought that the anathemas of the Code of Ethics against "advertising" and "nostrums" were like the resolutions in political platforms, "for effect" and not to be enforced. But their belief don't abrogate or even mitigate the punishment. That hurts just as much, coming unexpectedly, as though it had been definitely promised all the time; which it really was, although our esteemed contemporaries who have felt the lash hoped their little peccadilloes would be passed by unnoticed.

Some of the pleas in abatement are really "funny." Thus, it wasn't the editor who accepted these obnoxious advertisements, but the "business management." That is to say, the editor had a "wicked partner," just like Deacon Smith. The good deacon, you know, edited a newspaper in Cincinnati some twenty or thirty years ago. He was part owner of the paper, and was also a power in politics. But he was too good a man to descend to trickery. His partners may or may not have been as good as he was. Certain it is that no matter how freely "liars," "tricksters," and the other pleasantries of political campaign literature were hurled at his paper, his editorial adversaries were always punctilious to ex-

onerate the good deacon. It was always his "wicked partners" they were aiming at, they said; though we do not recall that the good deacon himself ever charged the sins of his paper upon his partners.

Of course, it's a good thing for a truly good man to have a "wicked partner" to shoulder the responsibility in transactions which, because of a shady side to them, had better be done without the knowledge of the good man, as it were. It may be a good thing for the editor of a dental journal to have a publisher who is not amenable to the code of ethics of the profession to assume the responsibility for violations of the spirit of the code by the journal. But it would seem to a man up a tree better for the good man to have no shady transactions; better for the dental journal to permit to itself no violations of the code.

It is easy to have such perfect accord between the editorial and business sides of a dental journal that the publication of an improper advertisement should be an impossibility; that is, if both sides are in harmony for the advancement of professional interests. If some other object is more important to one side or the other, of course that puts a different face on the matter.

We commend to our stricken brethren a study of the course of the DENTAL COSMOS, which in this, as in every other professional matter, will serve as an excellent exemplar for them and for others in doubt.

The first object in the publication of the DENTAL COSMOS is to produce the best dental journal which the resources of dentistry will permit. All other aims in its publication are subordinated to this, and editor and publisher are at one in that idea.

The Code of Ethics is the organic law of the dental profession. A dental journal which itself violates or encourages others to violate the code cannot be the "best journal which the resources of dentistry will permit." It becomes at once an enemy to *professional* progress.

So the DENTAL COSMOS abides by the code, in its business as well as its editorial conduct. It refuses and will continue to refuse to accept advertisements which themselves violate the code, or which encourage others to violate it. It has refused many advertisements which we have afterward seen printed in other dental journals. Its card of advertising rates which is sent to applicants for space in its advertising pages bears now, as it has for years, this reservation:

"The publisher reserves the right to reject any advertisement which may be regarded as injurious, misleading, or objectionable to dentists."

There is perfect accord between editor and publisher in this course. Should the business manager have any doubt as to the ethical character of an advertisement which is offered to the journal, it is referred to the editor, and his opinion settles the question of admissibility.

It is easy to be ethical if you really want to.

A Correction.

We were in error in attempting to correct Dr. Beebee's statement of the fineness of the solder made after his formula (see footnote, page 550, Dental Cosmos for July). His statement was correct,—15.428 K,—as a careful review of the calculation shows.

Dr. George W. Haskins, of Chicago, in the note subjoined, kindly proves the calculation by showing the exact correspondence between the pure gold in solder of 15.428 K and the quantity in the coin gold called for by the formula:

Chicago, July 12, 1897.

To the Editor of the Dental Cosmos:

Sir,—In the July number of Dental Cosmos, just received, on page 550, Dr. Beebee gives the carat of the solder as 15.428, of which he gives this formula:

7½ dwts. of coin gold;
35 grs. copper;
25 " silver;
12 " brass pins.

In note at bottom of page you give it as 10.664. It is very easy to demonstrate which is right. If Dr. Beebee had carried his fractions out he would have had 15.428571.* The fineness of gold alloy is expressed in parts of 24,—*e.g.*, in an 18k. alloy 18-24 of its weight would be gold. Consequently in the 252 grains of alloy which he would have by the formula given, $\frac{15.428571 +}{24}$ of it would be gold, or 161.99999 + grs. of pure gold. Coin gold is reckoned as 21.6 carats fine, which would give the amount of gold in 7½ dwts. of coin gold as 162 grs. Sincerely yours,

Geo. W. Haskins.

Dr. Beebee has himself also called our attention to the error. In the course of his note he gives the following rule for alloying gold to any carat, which we take pleasure in printing:

Rule for Alloying Gold to any Carat.

Multiply the amount of pure gold by 24; divide the product by the required carat; subtract from the quotient the weight of the gold, and the result will be the amount of alloy required.

* After the sixth decimal place the fraction repeats itself indefinitely, so that an exact result cannot be had.

If the gold is already alloyed, find the amount of pure gold in the mass and proceed as with pure gold, subtracting the alloy already in the mass from the result. This final remainder will be the amount of alloy to be added.

OBITUARY.

Dr. E. Magitot.

Dr. Magitot, who died suddenly from an attack of asthma in Paris, aged sixty-three years, was certainly the leading scientist of the century, at least in France, in matters concerning the teeth and oral cavity. His name is universally known here and abroad, and his work places him in the front rank.

He was born in Paris, in 1833. His father was a dentist. He studied medicine, and graduated as a physician at the age of twenty-four, his thesis being an essay on "The Development and Structure of Teeth." On this subject he continued his researches, and in collaboration with Charles Robin, the famous professor of anatomy, he published a work on the "Genesis and Evolution of Teeth in Man and the Lower Animals," which appeared in the *Journal de Physiologie* in 1860-61. He was afterward associated with Ch. Legros in a number of publications on the same subject.

The science of micro-biology was then unknown, and he therefore had no knowledge of the influence of microbes on dental caries; but he discovered a chemical cause therefor, and in several works published about that time he demonstrated the reaction of acids on dental enamel.

In 1857 he issued his great work on "Dental Anomalies."

To the subject of phosphorus necrosis he gave much attention, and personally treated many sufferers from the disease employed in the lucifer-match factories. It was in the midst of his researches on this subject, and immediately after publishing an article on "Phosphorus Necrosis" in the *Revue des Deux Mondes*, that death claimed him.

Magitot was the pioneer in that branch of medical science known as stomatology. In 1888 he founded the Society of Stomatology, composed of dentists who had taken the medical degree, and was president by re-election from year to year until his death. If he had been asked, "Are you a dentist?" he would have replied, "No, I am a stomatologist." While most of his work related to the study and care of the teeth, he did not consider himself a dentist. A good dentist should be a good operator,—should be a master of the mechanical details of his profession; and Magitot loved theory, and did not give to the dental operator the credit we deem him deserving of. Operative dentistry has advanced wonderfully during the past thirty years, and we do not think Magitot kept pace with it. As to prosthesis, he believed that the application of any apparatus to the teeth should be the work of a physician, and that the manufacture of the apparatus should be left to special experts,—*i.e.*, mechanical dentists. We believe that a dental practitioner should be able to do this work himself, or at least to intelligently guide his assistants.

Magitot despised the manual ability and the thousand and one movements of the hand which constitute the expert dentist. He could not understand

this "game of patience," as he called it,—the ability to prepare and fill cavities. Let us look for the cause of this feeling in so vast a brain, so quick a spirit, so open to progress of all kinds in other matters. When in his prime, between thirty and fifty years of age, he was received in the medical world, and said that dentists had chosen an undignified profession,—as if there were any difference as to cleanliness between the care of the teeth and that of any other part of the body. It was taken for granted that a specialist of the rectum, or of the nasal cavities, had chosen a more scientific specialty than had the dentist, consequently Magitot preferred the term buccal surgery rather than dentistry proper. Hence it is explicable why he created the science of stomatology, as he understood it, meaning the theoretical study of the mouth and teeth. Stomatology was a religion that he had founded, and he was its high priest.

He was also open, frank, and ready to impart information to physicians interested in teeth, but cold, unamiable, stern, if he had to deal with a dentist not a physician. He contended that no one could properly practice dentistry without a medical education, and insisted that every dentist should have the physician's diploma.

Since 1892 it has been necessary in France to have the medical degree before becoming a D.D.S. One would think that Magitot would have bowed to the decree of the government, but he affected to ignore the D.D.S. He would not place himself at the head of a college, where he would have become the venerated chief, and would have been remembered by Frenchmen, physicians and otherwise, as a benefactor to French odontology much as Tomes is in England. He preferred to seclude himself, and during the seventeen years and more of the existence of the College of Paris he never made it even a flying visit nor acknowledged its existence in any way, though its graduates have done more for the elevation of our art in France than has Magitot with all his science.

Since the formation of the school there has been a constant struggle between the chief of stomatology and his adherents, and those founders of dental colleges who have consecrated so much time and energy to the one object. To-day the founder of stomatology is dead; the most powerful adversary of the schools is gone, and a new era looms before us,—an era of fusion and peace.—*Abridged from an article by Dr. E. Sauvez, of the Dental School of Paris, in "L'Odontologie," May, 1897.*

DENTAL LEGISLATION.

Dental Law of Pennsylvania.

Following is the text of the new dental law of Pennsylvania passed at the last session of the legislature, and approved July 9, 1897:

An Act

To establish a Dental Council and a State Board of Dental Examiners, to define the powers and duties of said Dental Council and said State Board of Dental Examiners, to provide for the examination and licensing of practitioners of dentistry, and to further regulate the practice of dentistry.

Whereas, The health and comfort of the public, and in many instances the lives of individuals, are contingent upon intelligent and competent dental service;

And Whereas, Properly educated and efficient practitioners of dentistry are therefore a public necessity;

And Whereas, It is expedient to assimilate the laws regulating the practice of dentistry with those now pertaining to the practice of medicine and surgery in this Commonwealth:

Section 1. *Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same,* That there shall be established a Dental Council of Pennsylvania, consisting of the Superintendent of Public Instruction, the president of the State Board of Health and Vital Statistics, and the president for the time being of the Pennsylvania Dental Society.

Sec. 2. The said council shall be known by the name and style of the Dental Council of Pennsylvania, and may make and adopt for its government all necessary rules and regulations and by-laws not inconsistent with the constitution and the laws of this commonwealth or of the United States, and shall have power to locate and maintain an office within this state for the transaction of business. Two members of the said council, one of whom shall be the president of the Pennsylvania State Dental Society, shall constitute a quorum for the transaction of business. In case of the absence of the president of the Pennsylvania State Dental Society from any unavoidable cause, he may nominate in writing one of the vice-presidents of that society to represent him at the meetings of the Dental Council of Pennsylvania, and the person so nominated shall be entitled to vote at the meetings, and his presence shall be equivalent to that of the president of the Pennsylvania State Dental Society in constituting a quorum of the said Dental Council.

Sec. 3. The said council shall organize at Harrisburg within thirty days from the date of organization of the Board of Dental Examiners, and shall elect from its own number a president. The secretary of the Dental Council, who shall also act as treasurer, shall be the secretary and treasurer for the time being of the Medical Council of Pennsylvania. The president and secretary shall hold their offices for one year, or until their successors are chosen.

Sec. 4. The said Dental Council shall hold two stated meetings in each year at Harrisburg, and they may hold special meetings at such times and places as they may deem proper. They shall supervise the examinations conducted by the State Board of Dental Examiners of all applicants for license to practice dentistry in this commonwealth, for the purpose of securing the conduct of examinations in harmony with the provisions of this act, and shall issue licenses to practice dentistry to such applicants as have presented satisfactory and properly certified copies of licenses from the State Boards of Dental Examiners or State Boards of Health of other states, as provided for in Section 12 of this act.

Sec. 5. It is further enacted that from and after the first day of September, A.D. 1897, there shall be and continue to be a Board of Dental Examiners for the State of Pennsylvania, which shall consist of six members, and each of said members shall serve for a term of three years from the first day of September next after his appointment, with the exception of those first appointed, who shall serve as follows, namely: Two for one year, two for two years, and two for three years from the first day of September, A.D. 1897. The Pennsylvania State Dental Society may at its annual meeting in 1897, and annually thereafter at said meetings, select as nominees the names of double the number of examiners required, who shall be members in good standing of the society, and transmit such names to the Governor under its seal and signed by its secretary. From this list of nominees the Governor shall during the month of August, A.D. 1897, appoint a Board of Dental Examiners. In case of failure of the said Pennsylvania State Dental Society to submit such list as aforesaid, the Governor shall appoint members in good standing of the said society without other restrictions. Each one of the said appointees must be a registered *bona fide* practitioner of dentistry in good standing, and shall have practiced dentistry under the laws of this state for a period of not less than ten years. No member of a dental college faculty shall be eligible to appointment

upon the State Board of Dental Examiners, but this shall not apply to membership in the Dental Council. The Governor shall fill vacancies by death or otherwise for the unexpired term of said examiners from the list submitted to him by the dental society, and shall remove any member of said board for continued neglect of the duties required by this act, or on recommendation of the said dental society for incompetency, unprofessional or dishonorable conduct. The Governor shall in his first appointments designate the number of years for which each appointee shall serve. The appointment of successors to those members whose term of office will expire on the first day of September of each year shall be made by the Governor during the month of August of such year, upon the same conditions and requirements as hereinbefore specified with reference to the appointment of an examining board.

SEC. 6. Said board shall be known by the name and style of Board of Dental Examiners of the State of Pennsylvania. Every person who shall be appointed to serve on said board shall receive a certificate of appointment from the Secretary of the Commonwealth. Said board shall be authorized to take testimony concerning all matters within its jurisdiction, and the presiding officer for the time being of the said board or of any of the committees thereof may issue subpœnas and administer oaths to witnesses. Said Board of Examiners shall make and adopt all necessary rules and regulations and by-laws not inconsistent with the constitution and laws of this state or of the United States whereby to perform the duties and transact the business required under the provisions of this act. Said rules, regulations, and by-laws to be subject to the approval of the Dental Council of Pennsylvania established by this act.

SEC. 7. From the fees provided by this act the Examining Board may pay all expenses incurred by its provisions in the conduct of its business as a board, after having apportioned and paid to the Dental Council a sum not exceeding one hundred dollars ($100) to liquidate the expenses incident to the conduct of the business of said council; and if any surplus above said expenses shall remain at the end of any year it shall be apportioned among said examiners *pro rata* according to the number of candidates examined by each, not to exceed five hundred dollars ($500) to each examiner, and any balance over and above this amount shall be paid into the treasury of the commonwealth.

SEC. 8. The first meeting of the said Examining Board shall be held on the first day in October in 1897, suitable notice in the usual form being given with the notice of their appointment by the Secretary of the Commonwealth to each of the members thereof, specifying the time and place of meeting. At the first meeting of the said board an organization shall be effected by the election from their own membership of a president and secretary. For the purpose of examining applicants for license the State Board of Dental Examiners shall hold two or more stated or special meetings each year, due notice of which shall be made public at such time and place as they may determine. At such stated or special meetings a majority of the members of the board shall constitute a quorum thereof, but the examinations may be conducted by a committee of one or more of the examiners duly authorized by said board.

SEC. 9. *Subjects for examination.*—All candidates for license to practice dentistry in the state of Pennsylvania (with the exception of those otherwise provided for in Section 12 of this act) shall be required to pass an examination by the State Board of Dental Examiners upon the following subjects:

1. General anatomy and physiology.
2. Special dental anatomy.
3. Dental histology.
4. Dental physiology.
5. Chemistry and metallurgy.
6. Materia medica.
7. Dental pathology, bacteriology, and therapeutics.
8. Anesthesia.
9. Oral surgery.

10. Principles and practice of operative and prosthetic dentistry.

Each applicant shall also furnish to the Board of Dental Examiners satisfactory evidence of his or her proficiency in the manipulative procedures of dentistry, either by producing an example of his or her work, duly attested by the demonstrator in charge of the clinic of the college issuing his or her diploma, or by a practical demonstration of his or her skill in the presence of the examining members of the said board.

SEC. 10. Said examinations shall be conducted in writing, and shall embrace all of the subjects named in Section 9 of this act. After each examination the board having charge thereof shall without unnecessary delay act upon the same. An official report of such action, signed by the president and secretary and each acting member of the said Board of Dental Examiners, stating the examination average of each candidate in each branch, the general average, and the results of the examination whether successful or unsuccessful, shall be transmitted to the Dental Council. The said report shall embrace all the examination papers, questions and answers thereto. All such examination papers shall be filed in the office of the Secretary of Internal Affairs, and kept for reference and inspection for a period of not less than five years.

SEC. 11. On receiving from the said Board of Dental Examiners such official report of the examination of any applicant for license, the Dental Council shall issue forthwith to each applicant who shall have been returned as having successfully passed said examination a license to practice dentistry in the state of Pennsylvania. Every license to practice dentistry issued pursuant to this act shall be subscribed by the officers of the Dental Council, and by each dental examiner who reported the licentiate as having successfully passed said examinations. It shall also have affixed to it by the person authorized to affix the same the seal of this commonwealth before said license shall be issued. It shall be recorded in a book to be kept in the office of the Dental Council, and the number of the book and page therein containing said recorded copy shall be noted upon the face of said license. Said records shall be open to public inspection under the proper restrictions as to their safe-keeping, and in all legal proceedings such records and copies or exemplifications thereof certified by the secretary of the Dental Council under seal shall have the same weight as evidence that is given to records and certified copies of deeds for the conveyance of land.

SEC. 12. On and after the first day of October, 1897, any person not heretofore authorized to practice dentistry in this state and desiring to enter upon such practice may deliver to the secretary of the Dental Council, upon the payment of a fee of fifteen dollars ($15.00), a written application for license, together with satisfactory proof that the applicant is not less than twenty-one years of age, is of good moral character, has obtained a competent common school education, and has received a diploma conferring the degree of Doctor of Dental Surgery or other recognized dental degree from a reputable institution of the United States recognized as of good repute by the Board of Dental Examiners of this state and legally competent to confer the same, or a diploma or a license conferring the full right to practice the branches of dentistry in some foreign country. Applicants who have received their degree in dentistry after the first day of October, 1897, must have pursued the study of dentistry for at least three years, including three regular courses of lectures each extending over a period of at least six months in separate years in some legally incorporated dental college or colleges prior to the granting of said diploma or foreign license. Such proof shall be made, if required, upon affidavit. Upon making such payment and proof the Dental Council, if satisfied with the same, shall issue to such applicant an order for examination before the State Board of Dental Examiners. In case of failure at any such examination, the candidate, after the expiration of six months and within two years, shall have the privilege of a second examination by the said board without the payment of an additional fee, but for any other subsequent examinations he shall pay the usual fees prescribed in this act. And it is further provided that applicants examined and licensed by the State Board

of Dental Examiners or State Board of Health of other states, on payment of a fee of ten dollars ($10) to the secretary of the Dental Council, and on filing in the office of the Dental Council a copy of said license certified, with the affidavit of the president and secretary of such board showing that the standard of requirements adopted by the said State Board of Dental Examiners or State Board of Health is substantially the same as provided by Sections 9 and 12 of this act, shall without further examinations receive a license conferring on the holder thereof all the rights and privileges provided by Sections 13 and 14 of this act.

SEC. 13. From and after the first day of October, 1897, it shall not be lawful for any person in the state of Pennsylvania to enter upon the practice of dentistry unless he or she has complied with the provisions of this act, and has exhibited to the prothonotary of the Court of Common Pleas of the county in which he or she desires to practice dentistry a license duly granted to him or her as hereinbefore provided, whereupon he or she shall be entitled upon the payment of one dollar to be duly registered in the office of the prothonotary of the Court of Common Pleas in the said county; and any person violating any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction thereof in the Court of Quarter Sessions of the county wherein the offense has been committed shall pay a fine of not less than fifty dollars ($50.00) nor more than two hundred dollars ($200.00) for each offense.

SEC. 14. Nothing in this act shall be construed to interfere with or punish physicians or surgeons in the regular practice of their profession from extracting teeth for the relief of pain or making applications for such purpose, or shall interfere with or prevent *bona fide* students of dentistry in the regular course of their instruction from operating upon patients at clinics or under the immediate supervision and in the presence of their preceptor who is in lawful practice, provided that no fee, salary, or other reward for such operations shall be received either directly or indirectly, under any circumstances, by any student of dentistry. And nothing in this act shall be construed to prohibit the practice of dentistry within this commonwealth by any practitioner who shall have been duly registered in accordance with the laws of this commonwealth existing prior to the passage of this act, and one such registry under this act shall be sufficient warrant to practice dentistry in any county in this commonwealth.

SEC. 15. All disbursements of money provided for above in this act shall be made by the secretary of the Dental Council upon the instructions of the Dental Council, who shall give all such instructions by resolutions in such case adopted by a quorum as defined in Section 2 of this act.

SEC. 16. The acts of April 17, 1876, June 20, 1883, and of June 10, 1893, regulating the practice of dentistry in this state, and all other acts or parts of acts of Assembly inconsistent herewith, shall be and are hereby repealed.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JUNE, 1897.

June 1.—No. 583,472, to HENRY HEATH, JR. Dental disk mandrel.
" " No. 583,565, to C. M. CARR. Dental bridge-work.
" " No. 583,625, to C. C. and JOHN LUSBY. Dental hand-piece.
" " No. 583,735, to C. W. DODGE. Dental polishing disk.
" " No. 583,848, to R. A. DUNLAP. Dental impression cup.
" 15.—No. 584,345, to A. L. and B. F. GILMER. Artificial denture.
" 22.—No. 584,839, to JOHN E. ANDREWS. Dental flask press.
" " No. 584,847, to R. H. BOOTY. Automatic plugger.
" " No. 585,126, to GIDEON SIBLEY. Dental hand-piece.
" 29.—No. 585,305, to JAMES K. BURGESS. Tooth-crown holder.
" " No. 585,358, to F. D. GOULD. Tooth-brush.
" " No. 585,494, to C. E. WILLIAMS. Dental engine mallet.

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ANNUAL ADDRESS.

BY JAMES TRUMAN, D.D.S., PRESIDENT.

(Read before the American Dental Association, August 3, 1897.)

MEMBERS OF THE AMERICAN DENTAL ASSOCIATION:

The annual gathering of a body such as this constitutes an ever-recurring era in dentistry, and should mean, to the reflective mind, a period of advance along all lines of work. If this fails to be realized, then the year has been valueless, and should be regarded as a period lost in the progress of the race.

The interest that has been manifested everywhere since the close of the last session of the American Dental Association, at Saratoga, indicates that the dental profession is fully alive to the importance of this meeting at Old Point Comfort, and of the possibilities which may accrue from its deliberations. I therefore wish to congratulate you on the fact that those here assembled have met upon a mission not second in importance to any of the meetings that have preceded this, and it may, perhaps, when the results have all been summed up, transcend all others, for, if the feeling be judged aright, we have reached the "parting of the ways," and the rising sun of another day already appears above the horizon, illuminating the approaching century with a golden halo, indicating brilliant but as yet unfathomable possibilities.

The work of the past year will compare favorably with that of those preceding it. Yet it must be conceded that the spirit of activity is not abroad in the land, or in our profession. It is unfortunately too true that our calling tends to physical depression and disinclination to that higher work so necessary for advancement. The physical slavery which practice entails is not conducive to active mental effort, and the exhaustive day inclines to rest

rather than to renewed activity during the evening hours. The result of this enforced inertia is to self-sacrifice, and the man of investigating mind will turn indifferently from the bank account to the solving of problems, and eventually he becomes, not a practitioner, but a laboratory devotee. Through this division of labor there has arisen a very small class who are the prophets of the age, and these are they to whom we have learned to look for the new ideas which mark progress.

The various reports will call to your attention the things new and old of special interest. It will suffice here to say that the practical side of dentistry has not exhibited any features during the year worthy of special comment. This, however, must be said, that the literature of this portion of our work has been greatly enriched by several notable productions, and while there has been little absolutely new, there has been marked improvement upon older methods of work.

The uncertainties attending the introduction of cataphoresis have received careful practical observation and quite thorough experimental tests, and this process is gradually finding its true level in practice. Its adoption by the dental profession has been certainly phenomenal, and this constitutes its greatest danger, for the unwise rush in and attempt the impossible, forgetting that pain is the sentinel upon the advanced picket line and an ever-present warning of danger. To use this method to the best good of the patient means a high order of anatomical knowledge, so far as the teeth are concerned, and this point needs more and more to be impressed upon the dental mind everywhere.

The work in what may be called the scientific side of dentistry has received fresh impulse through the labors of Black, Andrews, and Williams, and the labors of dentists in England and on the continent have advanced our knowledge and aided in the solution of many abstruse problems. That a large portion of this work has been accomplished by Americans is worthy of special mention at this time. It is recognized, however, that science knows no nationality, and any attempt to erect boundary lines should be crushed in its inception; but, while this is true, the fact remains, and it is one worthy of self-congratulation, that at last, in our history, a class has arisen in this country the equal of any similar body of unselfish men to be found among the older civilizations, and worthy of the highest honor. This class must ever remain a small one, but it is to its efforts that we must look for the ennobling of our race on this continent in all the higher walks of intellectual life.

In this connection, it is befitting the occasion that we express our deep regrets and sympathy that the most brilliant exponent of this class, Professor W. D. Miller, is physically suffering from the exhaustive labors to which he has subjected himself. It is felt that all here assembled will send back to him the expressed desire that he may know a full restoration to health and activity.

The year has brought with it serious losses in our ranks, both at home and abroad. It is proper that we should stop in the busy whirl of daily duties and consider what these men were to us and

what we owe to their memories. Their mission on earth has been completed, but the work they did is the precious heritage of their profession, and it should be our duty to treasure it and add thereto, that the incoming century may feel the diviner inspiration to more exalted ideals.

The Committee on Necrology will doubtless present suitable resolutions upon the character and work of our revered members who have passed from the shadow of things to the eternal verities of the life everlasting.

To review a year is not difficult, but to grasp the progress made in a century is a problem from which the wisest and most cultivated might well shrink in dismay. The attempt will not be made here, but the near approach to the close of the nineteenth era of Christian brotherhood naturally causes a retrospection, and the query is ever uppermost, "What have we stored up for our profession in the past one hundred years?" It is a very glib expression upon the tongue of the unthinking that all we know of dentistry worthy of the name has been acquired in this century. While this period has been fruitful in progress, the claim can never be made that we owe little or nothing to the one hundred years preceding. The intelligent student of dental history soon comes to recognize that we must moderate our claims and give credit to the last century as being worthy of our highest regard. It must be learned further that this child of the professions—dentistry—was not born in America, but was nurtured in France, England, and Germany, and developed there upon a broad experience, that made its fractional life here in America but a continuation of that of the years preceding.

While this is gratefully conceded, it must be acknowledged that dentistry has shown an increased vitality upon this continent, and that the progress made has been proportionately greater here than elsewhere. Neither in the Old World nor the New was there any real advance in this work until near the close of the last century, when porcelain teeth were introduced by Chemant, of France. Then, in the present century, came the introduction of arsenic for the devitalization of the pulp by Spooner, of Montreal; the filling of the canals; the revolution in surgery by the discovery of anesthesia by Wells and the introduction of ether by Morton, both dentists; the introduction of cohesive gold by Arthur; the adoption of the mallet and the invention of the electrical mallet by Bonwill; the invention of the various forms of dental engines; the rubber-dam, and, finally, the use of electricity as a motive power and as an obtundent. These are the prominent and marked stages which have been taken, each aiding to carry us forward to our present position. The countless details of minor improvements cannot even be mentioned here, but without their aid all present know that the practice of dentistry would, to many, be almost impossible.

The crowning glory of the century, next to that of the discovery of anesthesia, has been the solution of the problem of the ages, caries of the teeth. While giving due prominence to the labors of a host of active investigators, from the days of Leeuwenhoek down

through Erdl, Ficinus, Klencke, Leber and Rottenstein, Milles and Underwood, Magitot, Tomes, we must give the credit for the final completion of the great work to Professor W. D. Miller, resident of Berlin, Germany, but native of this country. It is a special cause for congratulation that this investigation has been completed in this era and during the two decades that close the century.

It is also worthy of historical mention that dental education received its first impulse in Baltimore, Maryland, the adjoining state to that in which we are now assembled, Virginia, the Mother of Presidents. The wave thus started has been widening its circles ever since, until it has embraced all civilizations. The progress in this direction is unexampled in professional educational work, and it is safe to assume that it has not only reached an equality with that of general medicine, but, in some respects, has led that venerable mother into paths she had not thought of treading. The steady advance in the standard of dental education, the extension of the curriculum, the erection of noble buildings for dental training, the grasp of new ideas, are all signs of that activity which makes for progress. It was a natural sequence to this when Professor Winder, dean of the original school of dentistry, suggested the formation of a legislative body for all dental colleges, and the outgrowth of this idea was the formation of the National Association of Dental Faculties, not the least of the remarkable products of the century. To this organization we owe all the advances made in dental education in the United States, and we, as a profession, may look forward with trustful confidence that its work in the future will maintain the high record it has earned in the past.

The natural and final result of advanced thinking and acting is law. A world without law would represent chaos, if such a condition be thinkable. Law, in the professional sense, is the embodiment of orderly rules of conduct, and should be recognized as necessary for the good government of dentistry, as well as all organized bodies. The result of educational advance meant a proportionate demand for restriction,—law-making. There is the natural law of all things which works for harmony, and there is the man-made law, which is very frequently a source of inharmony. The final outcome of this legal tendency has been laws in every state, a National Association of Dental Examiners, and a general feeling of disquiet among all teachers of dentistry as a consequence. Whether this product of the nineteenth century is to result in the good anticipated by those who worked for it remains yet to be seen, but it is hoped that this association will see the way clear to formulate something that will tend to quiet the growing antagonism engendered by the unwise multiplication of statutes. The subject is a large one, and has frequently claimed the attention of my predecessors in office. As these laws at present stand, they are a dangerous obstacle in the path of professional progress, and promise to be the one blot upon the otherwise fair fame of the century in dental work. This applies not specially to individuals, for it is recognized that it is mainly the outgrowth of a mistaken

sentiment that force, through law, will accomplish everything. The aim should be for a unity of effort with the least friction, state with state, accompanied by a positive recognition that the decree of one state should, in this matter, be a law for every citizen of the United States. The Constitution of the United States expressly declares,—

"Art. IV, Sec. 1. Full faith and credit shall be given in each state to the public acts, records, and judicial proceedings of every other state, and the Congress may, by general laws, prescribe the manner in which such acts, records, and proceedings shall be proved and the effect thereof.

"Sec. II. The citizens of each state shall be entitled to all privileges and immunities of citizens in the several states."

These quotations are apparently clear, and they unmistakably point to two facts: that full faith and credit shall be given in each state to all the acts of every other state, and that Congress shall prescribe the effect of all such laws and how such shall be proved; and further, that a citizen of one state shall be entitled to all the privileges of citizens of the several states. It is therefore clear that a law passed depriving a citizen, who has been declared legally entitled to practice in any state, of the privileges of registration in another state is unconstitutional, and it is difficult to understand how the Supreme Court of the United States could decide otherwise if a case should be carried before it for adjudication.

Out of forty-three states and territories having laws regulating the practice of dentistry, in thirty-two the Examining Boards are appointed by the Governors. In eight the state societies have the selection; in one the Board of Public Works selects. In another the selection of the board is partially made by the Governor. In another the appointments are made by the Board of Health, and in the District of Columbia by the Commissioners of the District.

The graduates of the dental colleges of this country are subjected to the final decision of men who are not accountable to the dental profession, but owe their places to political preference. The boards may be, and doubtless are in many cases, composed of men worthy to fill such responsible positions, but how is it possible to determine this fact? It is not surprising, in view of the origin of the large majority of these boards, that the National Association of Dental Examiners should attempt to declare what should or should not be the curriculum of each of the dental colleges of the United States. The only apology that can be offered for this insidious blow at dental education is that it emanated from men who have no familiarity with dental teaching, and who have based their conclusions on impracticable theories.

It is not possible, perhaps, for the American Dental Association to legislate to correct this growing evil of state boards, as such action would be inoperative. It can, however, use its powerful influence, as the representative body of American dentists, to have all places on the boards filled upon the recommendation of state dental societies, or by bodies having similar powers. The suggestion made that persons to be eligible for state examiners should themselves be examined is certainly worthy of consideration; but at

present there is no power to compel this, and it will be a long time in the future before a general law by Congress will be passed covering professional educatien in the states.

The deep responsibility of this occasion must be felt by every one here assembled. It means the old interrogatory,—old as humanity,—"What shall we do to effect our salvation as a national organization?" The hour has come for action, but the hour brings with it thoughts new and old. The past historical record of the American Dental Association is replete with undying memories, and the work accomplished should stir the mind to solemn reflections. In the background stand our dead brothers, and we can most truly believe that they point with uplifted arms to the future, and from the unseen comes the command, "March on!" For the progress of professions as well as civilization can only be accomplished through changes,—the death of the old, the installation of the new.

The organization of societies in dentistry in the United States is but little over half a century old. The condition of things in the dental profession in the "thirties" can scarcely be conceived by the liberal minds of the present. It was a period of isolation. The hand of every man was against his fellow-practitioner. The walls of prejudice were erected everywhere. Doors were bolted and barred against intrusion. Lips were sealed, lest they might disclose an important method of practice. Nowhere throughout this progressive land, in dentistry, was there any light upon the medieval darkness. It, however, proved to be the period before the dawn. From behind all the cloud and shadow there was heard a voice proclaiming in no uncertain tones the old cry, "To your tents, O Israel!" but it fell upon deaf ears. It was the voice of Horace H. Hayden. With true prophetic inspiration he ceased not to demand that the dentists of the time should come forth from their isolation, and with something of the spirit of the old crusaders unite and arm for the approaching conflict. The day came when Horace H. Hayden conquered, and in New York the first society was born into life, but died in the birth. Again we find this courageous pioneer at the head of the American Society of Dental Surgeons, and then, for the first time on this continent, began the true life of associative dental effort. We rear monuments to our great men and women, but the only monument yet reared to Horace H. Hayden lies in the historical record of his deeds. Upon his neglected tomb I would lay this chaplet, that the dental profession may never forget what it owes to this one man who labored that we to-day may live.

The past of the American Dental Association is familiar to all. It is a worthy record. It began its life amidst much confusion as to organization. It was the conservative embodiment of that intermediate thought between the crushing power sought to be enforced by the old American Society of Dental Surgeons and that extreme liberal sentiment embodied in the American Dental Convention. The organizers of the American Dental Association builded well for their day and generation, with the result that it has continued

its active life for thirty-eight years. Has it fulfilled its destiny? Time alone can answer this profound question. We are here to-day to meet with our Southern brethren to attempt the solution of a difficult problem. The affectionate interest of long association lingers around their organization as well as our own. Is the ultimate result to be that we meet to-day on consecrated ground to bury our past loves, to scatter the elements of separation to the four winds of heaven, and over the ashes erect the new temple of which the fathers had no conception, a union of all professional thought upon a foundation that will sustain the superstructure for many years,—it is hoped, far into the coming century?

The conditions under which the American Dental Association was organized made it impossible to effect radical changes in old methods. The period was replete with crudities in practice and theory. Colleges were few and not well arranged for the training of students. Ignorance prevailed of those scientific studies which were rightly regarded as essential to a true knowledge of the human organism. It was therefore impossible to form a strictly scientific body. Is this the condition at present?

Year by year the standard of training has been increased in our colleges, through the wise action of the National Association of Dental Faculties, bringing us to a period of enlarged culture, enabling us to view calmly and consider well our relations to the present and to the future.

The organization of a body such as has been contemplated is a serious matter, and should not be hastily entered upon. It would not be proper in this address to do more than suggest a path that would seem to be the correct one to follow.

We live in the present, but must build for the future, or that future will take the matter out of our hands and destroy the work of this day and generation. It is feared that the importance of this is not fully appreciated. The basis of all dental national organizations is derived from the American Medical Association. This, as stated, served its purpose well for that body, but in the American Dental Association this has tended to weakness, so much so that the cry has gone over the land, "The American Dental Association has ceased to be a body worthy of our support!" While this at no time has been true, the fact that such a statement has been heralded everywhere is indicative of a feeling that old methods have subserved their purpose and a new order of things is demanded. In view of this it would seem as though reorganization must, to be effective, be based upon an entire change of methods. Without attempting a solution of this matter, it may serve a purpose to point out what may be regarded as some things worthy of change in the old association. The first step in a national professional organization should be the proper arrangement of local societies. From these the national body must be formed. These local societies must be in direct connection with the national, and, therefore, be established upon a careful ethical basis, and a positive standard of entrance. This, as a rule, is entirely neglected, resulting in a membership of uncertain quality. The representation to the national

body is selected with more regard to availability than to qualifications. These delegates, if so disposed, become permanent members of the national organization, and eventually become part of the controlling body. In proportion as this grows will it become unmanageable and lose its scientific character. This is the history of all similar bodies so constituted. Science does not, cannot flourish in crowds.

The question then would seem to be, "Can reorganization be accomplished upon a different conception?" It will be difficult to change present methods in local bodies, but proper legislation in the national organization could in time effect much. A glance at the present and past condition of the American Dental Association may prove of value. The ineffectual efforts to increase the scientific work led to the formation of sections, under the supposition that these would tend to concentrate the labor and accomplish more than when left to the efforts of committees. The result has been no improvement over older systems. This is not stated as a complaint, for it is recognized not to be the fault of individuals, but of methods. The system is intrinsically weak, and can never effect any permanent good results.

The first fatal injury done to any organization is to found within its borders an aristocracy. This has been accomplished in this and similar organizations by the establishment of what is known as permanent membership. This has been the deadly poison that has eaten out the life of this American Dental Association. It was an aristocracy not based, as it should have been, as a prize for higher work, but upon ability to pay the yearly fee and attend the annual meetings. This separated most of the desirable element in the profession, and as a consequence very little of the real scientific work has been done within its borders.

If these views be accepted, it would seem worthy of our careful thought whether it is not time to originate a body distinct from all others, and which should embody elements of strength rather than weakness.

The idea which this address seeks to impress is that a national body should be the culmination of all below it. It should embrace the concentrated wisdom of all subordinate societies. In order to make it thus, the affiliating organizations should send to the national only such members as had given the profession satisfactory work. Their entrance and continuation in the national association could be arranged so that the latter would always be an active, living organization. The only aristocracy admissible should be a class set apart, who had earned special honor. This would never be a large number, and might be selected from the main body, with an honorary title.

With this care in the selection of members, the national body would always remain within working limits, and would partake of the character of the higher scientific bodies of older civilizations.

The suggestions here outlined will not in all probability meet the views of the majority, but it is hoped that if a new body be formed out of the two present organizations it will embody at least some

improvements over those long in existence. They have been tried and found wanting in those essentials that work for the highest good of the dental profession. It will not be disputed, it is presumed, that a national body is a necessary part of the organization of a profession. This recognized, it should be the aim of those having the matter in charge to make it worthy of the respect not only of the present time, but of the future.

The recent meeting of the American Medical Association, in Philadelphia, demonstrated that the division into sections to meet separately from the main body is not a satisfactory method. It is questionable whether much good is derived, even in medicine, from this practice, where specialties are more clearly pronounced and certainly more desirable, but in dentistry there is no such demand. We are, or should be, interested in every portion of our work, and can therefore meet on common ground, enlarging our horizon of thought and experience, and at the same time cultivate those social amenities so important in maintaining good fellowship among widely separated members of the same professional family.

The experience of the past few years has demonstrated that it cannot be expected that the regular practitioner of dentistry will, outside of a few isolated instances, work for the advance of his profession if it interferes with his daily work. The altruistic side of dentistry needs cultivation, but it will never assume large proportions. The true investigator of problems invariably finds practice irksome, and he is always ready to burst the bonds which environ him, if necessary, for the more enjoyable fields of the mysterious unknown. Few there are who can do this with that other problem, —daily bread,—staring them constantly in the face. It would seem therefore that the time had arrived when some means should be arranged to set free these imprisoned students and make it possible for them to work independently of the cares of life. When the new organization is perfected it is hoped that the possibilities in this direction may be considered, and that a fund may be established looking to financial aid to those who are continually sacrificing themselves and those depending on them that the profession may progress worthy of its high aspirations. Science seeks the cloisters in the world's life. Is it not time that we make those cloisters free from worldly anxieties?

With our faces averted from the past and present and directed to the opening of the new day, we can consistently ask, "What of that great future which lies before us?" Who has the prescient wisdom to fathom its possibilities? It is the as yet uncultivated plain; its mines have not been laid bare with pick and shovel; its gold and precious stones still remain environed by the accumulated mire and rocks of undetermined time, but over all these floats the spirit of progress, and her wings are never idle, nor will she be found wanting in inspirational power to influence men to work out the problems of the coming ages. The promises of that future will assuredly meet with full fruition, and we can confidently anticipate that, inasmuch as we have builded well with imperfect tools, those who come after us will rear more substantial structures and carry

the profession of dentistry to a standard as yet unthought of in our wildest imaginings.

Men of the North, South, East, and West, here assembled on ground consecrated by the martyrdom of many heroic spirits, can you not come together actuated by that same high sense of duty that led the thousands to sacrifice all of life's treasures for the good of others, and pledge yourselves to a renewal of effort to complete brotherly relations, forgetting the old and grasping the new, move onward in fraternal harmony towards the anticipations, the possibilities that lie entombed in the ever-developing future, the heritage of the incoming civilizations, which should prove the blessing of humanity, the ennobling of the professions, and the upbuilding of the life and intelligence of all the peoples of the earth?

The Study of Anatomy.

BY W. C. BARRETT, M.D., D.D.S., M.D.S., BUFFALO, N. Y.

(Read by request before the National Association of Dental Faculties, Old Point Comfort, July 31, 1897.)

This association has wrought a great work in securing the adoption of something like uniformity of action in the admission of students, and in the raising of the general educational standard. If one would have some comprehension of its beneficent influence, he has but to reflect upon what was the general character of American schools, and what their reputation abroad before the organization of the National Association of Dental Faculties, as compared with the present condition. And yet it has done but a small proportion of its manifest duty. Its accomplishments have been elementary.

It is not too much to say that our professional reputation must be what our colleges make it. We are the educators of those who are to be the leaders in the professional matters of the future. The next generation of dentists will be what we shall make it. Legislators may pass laws to regulate and restrict dental practice, but the stream can rise no higher than the fountain-head, and the practitioner of to-morrow must get his training and derive his professional knowledge from the school to-day. He must enter the profession by submitting himself to our guidance. The colleges are the fountain-head, and the stream will be limpid or foul according to whether we purify or contaminate it.

This should be a proud position. It certainly is a responsible one, and woe betide the college professor who does not realize his accountability. The man who accepts the honor which may appertain to this distinguished station, without striving his utmost to be in every way worthy of it, to fulfill every duty with an eye single to the best interests of student and profession, is unworthy a place in our ranks. He who assumes to arm the young men of our country for the battle of life, to fit them and equip them for an honorable career simply that he may minister to his own good, who

takes the teacher's place and ascends the instructor's rostrum from selfish motives, is a worse hypocrite than the preacher whose every-day life belies his own sermons.

I believe that we are all sincere in desiring to make our schools, and through them the profession, all that they should be. To secure this it is not enough that we look solely to the preliminary qualifications of those whom we accept as candidates for a confidential position in American families. We need to make our instruction as perfect as possible. This cannot be done unless there is a generally accepted standard, and some uniformity in system. At present one of our greatest sources of weakness lies in the fact that there is no common comprehension of a standard of methods. One school begins instruction with the alphabet, proceeds to the construction of simple words, and by regular gradations to the building up of sentences. Another commences by an analysis of the sentence into its component words, and then studies the elementary symbols constituting the words.

That is, one teacher is synthetical, and the other strictly analytical. A student takes his first and second year in one school, and then circumstances or inclination cause him to finish his course at another. He commences under analytical teachers, and closes with a school that only arrives at the stage of analysis in the closing year. Hence, in reality that student never reaches the end of any regularly graded course. In this way the practical efficiency of that graduate can never be assured. Let me illustrate this by the various methods of arriving at a knowledge of that basal study in all schools that attempt to teach the healing art—anatomy.

Some teachers open their course with an examination of the elements of which the human body is composed. That is, they begin with histology. They commence with the cell, and after having given a fair knowledge of that, they proceed to construct the cells into tissues, which are then considered. Then the tissues are built into organs, and finally the organs into the systems which they compose, and they do not arrive at a consideration of the human body as a whole until the last year.

Another pursues the opposite course. He begins with a study of the anatomy as a complete system. He considers its functions, and then goes on to study the organs whose actions make function, and finally to the ultimate elements of which organs and tissues are composed, and whose aberrant functions afford the pathological disturbances with which it is to be his life's work to battle.

The student who spends his first year in a school that begins with histology, and who goes to one that ends its course with tissue elements, never gets beyond elementary matters in his entire college training. This certainly will not tend to make the best practitioners, or to raise our profession to its highest point of efficiency. There should be a comprehension of the benefits of each method, a careful discussion of the merits of all systems of teaching, and an intelligent and discriminating adoption of that which is best. To this end I have accepted the invitation of the executive committee to bring this subject before you.

I am a believer in the analytical system. I think it is easier to arrive at an understanding by taking in pieces that which we do not construct, and thus get at a knowledge of the mysteries of that which we must attempt to repair. Let me give you my reasons for this faith, and then please allow me to listen while you show me wherein I am wrong, or confirm my prepossessions by your own corroborative testimony. Do not then understand me as speaking dogmatically when I propose the following methods in teaching anatomy, but only as offering suggestions.

Our sole reason for examining tissues and organs is that we may learn their action and function. Hence, we should begin with function. This requires that the preliminary examination should be of the system, and not of its organs. The study of anatomy, then, should commence with a general examination of the body as a whole. In a dental school the first year should be devoted to general anatomy, beginning with osteology, or the frame-work. Then the viscera should be taken up, and their general morphology and function should be studied. This should be followed by myology, syndesmology, and neurology, that a fair idea of the whole body may be obtained. Practical anatomy should be commenced this term, and one extremity dissected. It has sometimes been urged that the student should not dissect until he has learned something of anatomy. This argument would be cogent if the object were to learn how to dissect. But we dissect to learn anatomy, and do not learn anatomy to discover how best to dissect.

All the study of this year should be general. Not a hint of any specialty should be given, and hence the teacher for this year is preferably a medical man. If he is a dentist, he is apt to introduce his specialty too early. The general study of the human body should be finished in the freshman year.

In the second, or junior year, the student begins to differentiate in his study. He should now take up regional anatomy. He has finished the study of the body as a whole. Not that he has learned all that he should, but he has devoted all the time that can be spared out of a three years' course, and he takes up the study of the part to which he is to devote his attention as a specialist. His field is bounded below by the clavicle, and he must have a special, definite, intimate knowledge of all above that.

As a part of this he commences the study of dental anatomy. The first step in this is comparative dental anatomy,—that is, the study of the dental organs as a whole, precisely as he began the first year in general anatomy. The dentist who learns nothing of the general relations of the teeth, and whose comprehension of them is only that they are organs out of which he is to pick his living, cannot claim any scientific knowledge. The teeth in all the different classes of animals should be generally studied, until the dentition of man is reached, when his teeth should be intimately studied in all their anatomical relations. The anatomy of the second or junior year is, as a whole, devoted to organs, as is that of the first year to systems.

No man can finish the anatomical studies necessary to dental

practice in two years. He imperatively needs the third year, and this should be given up to careful examination and investigation of tissues. In this year the microscope is a necessary adjunct. The student has now learned enough of function to comprehend how it modifies, or is modified by, structural development. In this third and finishing year he does not entirely confine his attention to histological anatomy, but he continues regional anatomy, because he is not yet sufficiently familiar with the organs, especially of the head. He also bestows considerable attention upon surgical, and morbid, or pathological anatomy. But his chief attention is given to structural, or histological anatomy, and he thus finishes his course by attention to the minutiæ and detail for which he is unprepared during his first or second year, because he has not then the general knowledge to allow him fully to comprehend it, and because his mind usually is not sufficiently trained and disciplined to give him mastery over his attention.

The student who thus advances by regular gradations each year, separately taking up and mastering a definite branch or part of the subject, will be likely to retain his knowledge, because he has advanced toward it by a direct route, and because each division is made subsidiary to the next, and there is a regular gradation and progress.

If such a system, or if some other regular system, can be adopted in its general features by all of our schools, the grading of one who for any cause changes his college during his course will be greatly facilitated, and he will not be likely to miss any of the subdivisions. Our graduates will be better qualified for practice, and the tone of the profession will be elevated.

I would pursue the same general plan in the study of chemistry and physiology, the other basal studies of the theoretical curriculum. They should extend through the entire course, the last year in each to be devoted to special instruction adapted to an exclusive dental practice.

Materia medica should begin with the first year, but therapeutics cannot be profitably commenced until the student has obtained some knowledge of drugs, and hence it becomes a second- and third-year study, materia medica extending over the first two years.

Embryology properly belongs to the second year, because its study demands an acquaintance with technical terms that are all unfamiliar at the outset, and because it is an intricate and involved matter which requires a disciplined attention. Aside from these, there is no reason why it might not be begun with the freshman year.

Metallurgy is a second-year study, because its consideration demands a good acquaintance with general chemical laws, and these are acquired during the first year.

Surgery is a third-year study, because it demands not only a complete knowledge of anatomy, but a trained hand and absorbed attention as well. The student should begin the study of surgical pathology in the second year, and it may perhaps form a part of his general pathological studies.

Pathology should be differentiated from operative dentistry. They have very little in common, save that each may be curative. But operative dentistry is wholly mechanical and manipulative, while pathology should cover all medicinal and general treatment. Operative dentistry is largely prophylactic, while pathology is so to but a slight degree. Whatever has to do with the practical action of drugs, whether generally or topically applied, belongs to pathological practice. In the treatment of alveolar abscess, for instance, operative dentistry has very little part, its practice being confined to that which is mechanical, or that which is done with instruments. I believe that in the past we have not sufficiently distinguished between the two. A sharp line of demarkation should be drawn between that which is mechanical and that which is therapeutical.

It will be seen that I have not attempted to assign any place to the practical part of dentistry. My subject was the teaching of anatomy, but I have thought it not inappropriate to suggest some thought concerning other didactic studies.

Let me repeat that I have only considered the matter tentatively, and realize as fully as any of you that there is room for much consideration and extended discussion before the various studies in our curriculum shall each have been definitely assigned its appropriate place.

The Phenomena of Cataphoresis.

BY WESTON A. PRICE, D.D.S., CLEVELAND, O.

(Read before the American Dental Association, Old Point Comfort, Va., August 3, 1897.)

In this paper we will confine ourselves to the consideration of the phenomena attending the application of an electric current to the human body, *with* and *without* an interposing medicament, and especially its application to the dental organs.

There are three distinct theories as to the forces at work and their particular action in these processes, and, since there is such a diversity of nomenclature and variety of method for the application of these forces, we will include in this consideration all the methods of applying an electric current to the dental organs for producing anesthesia, whether used in conjunction with a medicament or not.

These theories are,—

First. The polarization of the tissue, producing an inhibition of the sensory impulse.

Second. Osmosis.

Third. Electrolysis.

The first theory provides that when an electric current is applied to a tooth, with or without a medicament, the conditions produced are due entirely, or almost entirely, to the effects of the current and not due to the medicament, other than its assistance in conducting a current. The supporters of this theory are here divided into two classes, from a difference of opinion of the exact

method of this inhibition,—whether the decreased excitability is due to the polarizing effect of the current on the tissue, or to its inhibition of the normal sensory impulse by its passage through the nerves.

So far as I know, the leading advocate of the former theory is Professor Neiswanger, of the Post-Graduate Medical School of Chicago. I have also heard Drs. Husted, Oberlin, and Heise, of Cincinnati, and some others favor this theory.

Professor Neiswanger said, in the discussion of an allied subject at the Ohio State Society meeting last December, that owing to the liberation of hydrogen at the negative pole and of oxygen at the positive pole there would be at these two regions respectively a condition of increased and decreased excitability, due to the production of an acid condition at the positive pole and of an alkaline condition at the negative pole, and that the zone of neutrality would be the median of resistance, and consequently that the negative or indifferent electrode should be placed as far as possible from the polarizing electrode. He detailed minutely the action of the gases on the tissue.

The adherents of this polarization theory maintain that the amount of current used is not great enough to produce sufficient electrolysis of the medicament used to produce its effect on the tissue. We will not stop to discuss the various theories until we have stated them all.

The other division of this first theory is, that a constant current applied to the dental branches of the trifacial nerve, with the positive pole applied to the tooth and the negative pole over the Gasserian ganglion, inhibits the normal sensory impulse. The leading advocates of this theory maintain that a certain and intricately definite amount of current, applied in the manner just described, will produce a condition of anesthesia in the tooth, and that either too little or too much will not produce this condition. They call it "short-circuiting the nerve." For its application the positive pole of the constant current is attached to the dental engine in such a manner as to make the bur the electrode, the handpiece being insulated and the negative pole applied over the Gasserian ganglion, on the same side as the tooth to be operated upon, which is perfectly insulated. The chief supporters of this theory are Drs. Horton, of Cleveland, and Lyder, of Akron, with a host of sympathizers. No medicament is used in either of these two processes except moisture in the former, the polarization theory, to reduce the resistance of the dentin. In the latter, the Horton method, the cavity is dehydrated.

The next theory provides that the medicament, which is applied under the electrode, is the agent which does the work, but that it is carried in by a physical force; that in some way, just as a stream of water carries sediment with it, so the electric current carries the ingredients in solution with it through the solvent and through the tissue. The advocates of this theory have furnished almost all the literature that has been written on the theory of cataphoresis since its advent, and in its ranks are to be found many of

the foremost men in the dental and medical professions. The most exhaustive articles bearing out this theory have been written by Drs. Morton, Peterson, and Phillips, while a number of shorter articles have appeared from other writers.

To secure the conditions best suited for the development of this process, the positive pole is placed in the cavity or on the tissue to be anesthetized, with an interposing layer of the obtunding medicine, and the negative pole placed at any more or less remote place.

Dr. Morton has said (see Proceedings of the First District Dental Society, New York, December, 1895), "You may even drive solid particles into tissue, and solid particles will move through fluids by the aid of electricity." He says in the same article, "You cannot be too sure of your osmosis."

Dr. Peterson, in his introduction to his valuable article in "The International System of Electro-Therapeutics," says, "From a medical standpoint, we understand by cataphoresis the introduction of medicaments, by means of electricity, into the body through the skin or mucous membranes. It seems to be a *purely physical process*, and has nothing to do with electrolysis." Very many others could be quoted from as supporting this theory with which doubtless you are familiar, but we will pass to the statement of the last theory, namely, electrolysis.

This theory provides that practically all the effect produced in passing an electric current through a medicament as applied in cataphoresis or in any other way is electrolytic. I have not been able to find a single person except one among the writers for the medical and dental profession defending this theory. It may, however, be worthy of consideration.

As the next steps let us consider,—

First. The physiological effect of a constant current on nerve-tissue.

Second. The laws governing osmosis.

Third. The laws governing electrolysis.

For the study of the first, take, for convenience, the sciatic nerve of a frog. Apply the electrodes of a polarizing current to two distant points from each other on the nerve. Before considering the phenomena of muscular contraction let us observe the conditions this current produces in the nerve, relative to any other irritant applied to that nerve. Suppose the irritant to be mechanical, not electrical, to prevent confusion with the polarizing current. The negative pole of the polarizing current is placed nearest to the muscle. The following phenomena will be observed:

First. That the nerve at different points has altered excitability. At some places less than the normal amount of stimulation will produce a contraction of the muscle, while at other points it will take far more than the normal amount of stimulation to produce this contraction, due to the passage of a current.

Second. It will be found that these regions of increased and decreased excitability are confined to the vicinity of the particular electrode,—the region of decreased excitability about the anode,

or positive electrode, and the increased excitability about the cathode, or negative electrode.

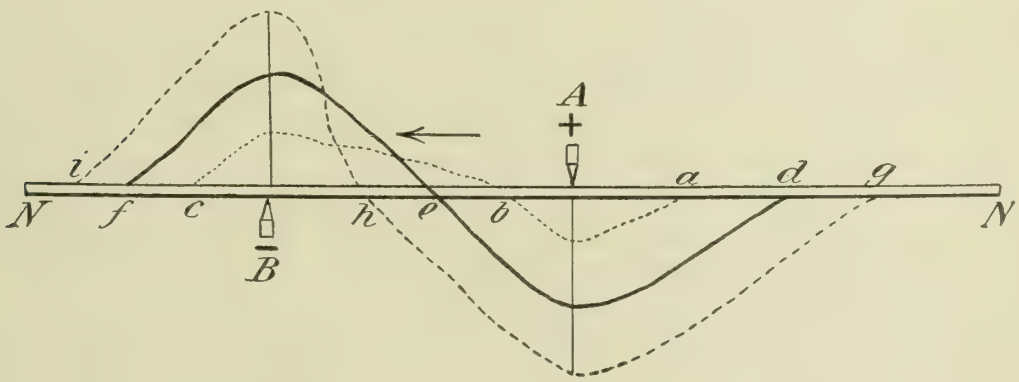
Third. There is a point between the electrodes of normal excitability, which point *varies* in distance from the respective electrodes according as the current is *weak* or *strong*.

Fourth. The *degree* of *decrease* or *increase* of excitability is in *direct proportion* to the strength of the polarizing current.

Fifth. This condition ceases practically at the instant the current is broken.

The alteration of excitability in the region of the poles we will know as electrotonus; that at the positive pole, or anode, as anelectrotonus, and that at the negative pole, or cathode, as catelectrotonus. These terms have been used by different physiologists to express two different conditions.

In 1843 Du Bois-Reymond discovered that the passage of a constant galvanic current through a portion of a nerve produced a change in the electro-motive forces existing between the longi-



tudinal and transverse surfaces, whereby the resulting *nerve-current* was either increased or diminished, according to the direction of the constant current. To this condition he applied the term electrotonus. It was subsequently shown by Pflüger, in 1859, that a definite change in the irritability of the nerve is also caused by the passage of a constant galvanic current, and as it is intimately related to the change in the electro-motive forces he applied to this *alteration of excitability also the term of electrotonus.* This will be the application of the term in this paper. He showed very clearly by the diagram the relative effects of different currents. "The abscissa line *N N* represents the nerve, the decrease in the excitability of which is indicated by an ordinate directed downward, and the increase in excitability by an ordinate directed upward. The electrodes conveying the current to the nerve are represented by *A*, the positive, and *B*, the negative pole. The relative extent of the alterations of the excitability, as revealed by the energy of the muscle contraction following the application of a uniform stimulus, is shown by the curves, the size and extent of which represent the changes produced by a weak, medium, and strong current. The curve also shows that with a weak current *(a, b, c)* the excitability in the anodal (positive) zone is decreased

and in the cathodal (negative) zone increased, and that the neutral point *b* lies close to the side of the positive pole. From this point the changes in excitability gradually increase, and reach their maximum in the neighborhood of the electrodes, from which both phases gradually decline. The position of the neutral point also indicates that by far the larger portion of the intra-polar region is in a condition of increased excitability, or catelectrotonus. The curve *d*, *e*, *f*, similar in its general form to the preceding, represents the alterations in the excitability produced by a current of medium strength; in direct proportion with the increase of current strength, there is an increase in the amount of anelectrotonus and catelectrotonus and the distance to which they spread themselves into the extra-polar regions. The indifferent point has advanced toward the center of the intra-polar region, indicating that this portion of the nerve is almost equally occupied by the opposite states of excitability. The curve *g*, *h*, *i* represents still further the changes following the employment of a strong current. The neutral point has now been shifted toward the cathode, and the intra-polar region is in a condition of anelectrotonus." These changes in excitability are not dependent upon or related to the special nature of the electrical stimulus, for they exhibit themselves upon the application of all forms of stimuli, whether mechanical, chemical, or thermal. The degree of electrotonus is in direct proportion to the strength of the constant current, even to the point of the destruction of the continuity of the nerves. This is a very important fact.

The foregoing laws pertain to motor nerves. Nothing analogous has yet been observed in secretory nerves, but Donders confirmed it in his experiments upon the inhibitory fibers of the vagus. *Does an analogous condition exist in sensory nerves?* This will be observed later.

These preceding laws, as also the laws of contraction produced by an electrical stimulus, have been established on the isolated nerves of frogs under abnormal conditions. Can they be verified on the living human body? Yes and no. Not, of course, under the same conditions, though they can under very complicated conditions. Why can they not? Because of the nerves being surrounded by tissues of different degrees of resistance. This will be the key to the answer of one of these theories.

Suppose the positive pole be placed in a tooth and the negative over the Gasserian ganglion, and suppose, for argument's sake, that the sensory impulse is inhibited, just as the motor is. Will the current travel on the nerve or on the surrounding tissue? To determine this I chloroformed a dog, and with expert assistance dissected out the inferior dental nerve from near the base of the skull to the inferior dental foramen and insulated. The lower cuspid on the same side was excised and insulated, and an electrode placed in the pulp-tissue. With very great care the current through the path, the "pulp and nerve," was determined and found to be 23,630 ohms. The resistance through the path, "the pulp to a point equidistant away on the muscle," with the same electrodes,

was determined and found to be 18,570 ohms, which was 5060 ohms less than that of the nerve.

What does this mean? Simply that if the Gasserian ganglion were right on the surface and the negative pole applied to it, the amount of current passing through each, the nerve and muscle, would be inversely in proportion to their resistance. But the nerve does not come to the surface, hence the current to pass through the nerve must travel along on it to a point opposite the negative electrode and then pass out through the tissue to the surface, which the advocates of this theory claim it does. But an electric current always seeks out the path of least resistance, so to fulfill the requirements of this theory the resistance through the nerve would have to be infinitely lower than the resistance of the surrounding tissue. A point of interest here is that the cross-section resistance of a nerve is still five times greater than its longitudinal resistance. The facts are that the current would diffuse throughout the entire tissue of that side of the face, and the amount of current flowing through the nerve at any point in cross-section would be less than that flowing through the same cross-sectional area of the tissue at any point around it within a wide area. Hence the theory of *short-circuiting a nerve* is inconsistent, and its accomplishment in dental therapeutics clearly impossible.

I have demonstrated this same fact on the inferior maxillary of a sheep and on the sciatic nerve of a frog. This is a very important consideration, since it determines to a greater or less extent the possibility of the realization of the fundamentals of both the inhibition and the polarization theories. It was because of this fact that Erb, in 1867, failed to verify on the human body the laws established by Pflüger in 1859. (See *Deutsches Archive für klin. Med.*, Band III, S. 238, 513.) He found as a constant result of many experiments that there occurred a diminution of excitability in the extra-polar catelectrotonic region and an increase in the extra-polar anelectrotonic region.

Helmholtz subsequently demonstrated that the cause of this deviation from Pflüger's law is the position of the nerve in the uninjured body. He says, "Since the nerve is in a position surrounded by a well-conducting medium, even better than itself, the current density in the nerve must rapidly decrease with distance from the electrode. While, of course, under the polarizing electrode the current density in the nerve is the greatest, this density, on account of the moist conductors surrounding the nerve, so rapidly decreases that it becomes almost *nil* for the nerve at even a small distance from the electrodes. At a small distance from the positive pole, therefore, the density is so slight that it may be assumed without error that the current now leaves the nerve, or, in other words, that the cathode, so far as the nerve is concerned, is to be found at this point. It is to be expected, therefore, that the effects of the opposite pole would be observed at only a short distance from the applied pole."

Erb, at this suggestion, renewed his investigations, eliminating

this error, and got results harmonizing perfectly with the laws established by Pflüger. For his method of eliminating this error, see Bigelow's "International System of Electro-Therapeutics."

This fact was more thoroughly established by Waller and De Waterville (Physiological Transactions of the Royal Society, 1832), to which reference can be made, or to Waller's "Human Physiology," 1891, page 363.

Now to return to the application of a constant current to the dental organs. Where will the current leave the dentinal nerve if the positive pole be upon the exposed pulp and the negative elsewhere? I need not go into the anatomical structure of the pulp; with that you are certainly all familiar. Nearly two-thirds of a pulp-chamber consists of blood-vessels and their contents; much less than one-third of nerve-fiber, and the remainder of connective tissue, etc.

The blood has a greater conductivity than the nerve-tissue for the same cross-sectional area, consequently most of the current will travel through the surrounding tissue and not through the nerve-tissue. The size of the apical foramen and the resistance through the walls of the pulp-chamber are of some importance in this connection, but time will not permit of their discussion here. In the case considered above but a very small per cent. of the entire current flowing would travel for any distance on the nerve-fibers, since it would go direct to the less resistant tissue. Suppose the current applied just as in the last case, except that the pulp is not exposed and the current must pass through the dentinal tubes. Here, it seems to me, would be an ideal condition for the demonstration of either the polarization or the purely inhibition theory. We would expect that since these tubes contain chiefly the projected fibers of the odontoblastic or spindle-shaped nucleated cells surrounding the pulp, and which are supposed to be the periphery endings of the dentinal nerves, the current would of necessity have to pass through this structure to the pulp before it could disseminate to the other structures. Of course, the lime-salts of the dentin are a non-conductor. If any effect is produced by applying the current in this manner through the drill, it must be on this structure in the tubes, for it would disseminate immediately on arriving at the pulp-tissue. We shall not discuss whether or not these cell projections fill completely the space of these tubuli; probably so, or very nearly so. However, the fact we wish to establish can be easily clinically demonstrated.

Will the current applied under these conditions produce anesthesia of the part to any considerable extent, and why? This is to be answered clinically and theoretically. I give my answer guardedly and after giving the question a very thorough investigation to my own perfect satisfaction, *No.* From a physiological standpoint it would not be possible, since we are dealing with a sensory nerve, whose function is to produce the sense of pain with the very slightest irritation, and with the most sensitive one in the whole human structure.

If the sensory nerve did not respond in the form of pain to the

passage of the current we should expect even then that the amount of current necessary to produce this condition, judging from motor nerves, would be many milliamperes.

But you say that the impulse which carries the sensation of pain in the sensory nerve is related to the internal nerve-current of the nerve discovered by Du Bois-Reymond, and why could not this impulse be interposed by an artificial current, thus preventing the pain impulse to pass? This can be answered in two ways: First, this *nerve-current* always travels from center to periphery in motor nerves and from periphery to center in sensory nerves, always in the direction of the impulse; hence it would be in the same direction as the polarizing current, which really increases this *nerve-current* when in the same direction. We should then expect on this theory an increase of sensitiveness.

Again, the normal sensory impulse has no connection with this *nerve-current*, and again even the origin of this *nerve-current* would answer this question. It is to my mind the height of unreasonableness to expect to be able to pass enough current through that sensory nerve to produce the condition of anelectrotonus, since the pain limit will permit scarcely the thousandth part of so great a quantity of current to be passed as would be necessary to produce that same condition in a motor nerve, provided the sensory nerve were capable of an analogous reaction. For the clinical answer to this question I have tried in vain to produce this condition, using every variety of conditions in the tooth and combinations of potential and resistance possible in instruments on the plan of this theory. It is very simple, and would be ideal if possible. Any good cataphoric apparatus will produce every possible combination of any of these instruments that I have seen that are in use at the present time, though not as they were first used. The Horton instrument has a possible total potential of less than six volts and has a variable resistance of less than 50,000 ohms in series, and divided into twenty-four divisions in such a way as to make almost any combination up to that total possible.

I have demonstrated elsewhere and verified repeatedly that the resistance through a tooth, accordingly as the cavity is wet or dry, will vary all the way from thousands to hundreds of thousands of ohms. I have measured cavities in dentin after dehydrating, and found them to vary from 20,000 ohms to over 1,000,000 ohms, and in different parts of the same cavity almost that amount of variation over the surface of the dentin alone, while through the enamel, of course, these figures would be multiplied by thousands.

Two things must be evident to every one at a glance,—viz, that in delivering the current to tooth, from the bur as the positive electrode, it is impossible to have a uniform amount of current flowing as the bur is moved to different parts of the cavity, owing to the variableness of the resistance of the different parts of the cavity, and that with so very high a resistance it would be impossible to have more than an extremely weak current flowing unless the potential were very many times that used.

With the instruments I use, which have been specially constructed, I can measure with precision and express in amperes any amount of current, from the one-hundred-and-twenty-five millionth of an ampere to one-twentieth of an ampere. I have measured the actual amount of current flowing in amperes in the use of two of these instruments as used by their exponents, and found it to vary from six-millionths of an ampere to one twelve-millionth in one case with one instrument, and from one six-millionth to one sixty-millionth of an ampere in one case of another instrument. In my own subsequent investigations I have collated considerable data showing a much greater variation than the above. In view of the fact that this condition of anelectrotonus is in direct proportion to the amount of current flowing, I have passed as high as two milliamperes of current through a healthy live pulp and tried to work on it at the same time, but could not produce this condition of anelectrotonus, even while so strong a current was flowing. I have let it flow for fifteen minutes and not been able to produce any such condition to a sufficient degree to permit of touching the pulp, even slightly, without pain. We saw from the law established by Pflüger that this condition was in direct proportion to the amount of current flowing; hence how impossible for the millionth part of an ampere to produce this condition if two thousand times as much could not.

Another law enters at this point making the realization of the anelectrotonic condition of the dental nerve impossible, which is the law of stimulation of an electric current. This is, that it is the sudden variations of current strength which excite muscular contraction in a motor nerve or in a sensory nerve that produce its normal impulse, pain; hence when the current is delivered to the tissue from a revolving bur every blade brings with it an interruption of the current strength, which, if the current strength were great enough to produce anelectrotonus, would produce such pain as would be positively unbearable. You could scarcely imagine anything more excruciating.

I have an abundance of reserve proof for sustaining this position, among which are the personal experiences of two different afternoons' use of this process on my own teeth by the original introducer and a couple of other similar applications of the method by other advocates, also using it myself on very many patients. Try it yourself. The only precautions are to insulate the tooth and the hand-piece perfectly, and begin with a minimum amount of a constant current and gradually increase.

What are the laws governing osmosis? This theory provides that when we apply an electric current to tissues with an interposing layer of some medicament under the positive pole, the medicament will be carried into the tissue by means of a physical force possessed by the current.

What is osmosis? It is the diffusion of a dissolved substance in a solvent to equalize the concentration.

If a layer of pure water be placed over a solution of sugar, the system immediately commences to suffer a change. The particles

of sugar immediately rush from places of a higher up to places of a lower concentration. This diffusion process, as the phenomenon is called, does not cease till the concentration has become the same in all parts of the solution. Let us imagine the sugar to be separated from the pure water by a semi-permeable membrane, such as will allow of the passage of the water, but not of the sugar. Of course the sugar will exert a pressure, and since it cannot go to the water it will produce a hydrostatic force against the partition, which will be moved upward if the apparatus be so arranged that it can; or if the partition cannot move and the chamber in which the sugar is confined be arranged with a capillary tube, the water will pass into the sugar solution through the membrane, increasing the volume of the confined solution, causing it to rise in the tube to a height equal to the osmotic pressure of the sugar. The fact is, that all the conditions just assumed can be realized. This condition exists in any possible solution, and is influenced by many conditions.

The osmotic pressure of cane sugar in water has been demonstrated by Pffefer, using cupric ferro-cyanide as the semi-permeable membrane. He has shown that a saturated solution exerts a pressure of about four atmospheres, which would, at the ocean level, be about sixty pounds to the square inch. The osmotic pressure is in a definite proportion to the concentration and temperature.

This condition is perfectly analogous to that of a gas confined within inclosing walls. It exerts a definite pressure, which is influenced both by temperature and density. The molecules of the gas tend to fill all possible space, each endeavoring to get just as far from every other molecule as possible. Just the same condition exists among the molecules of the dissolved substance; every molecule endeavors to get as far from every other molecule as possible, thus filling the greatest possible space, and they will continue so to do just as long as more pure solvent is provided.

It has been demonstrated by Nernst and Van-Hoff and others that "the osmotic pressure *is independent of the nature of the solvent*, and in general obeys the laws of gases." The various proofs for establishing this law are given in Nernst's "Theoretical Chemistry," 1895. It has also been demonstrated that "solutions having the same osmotic pressure can be obtained by dissolving equimolecular quantities of the most various substances in the same solvent."

It has long been noticed that a coincidence existed between the osmotic pressure of a substance and the gas pressure of the same substance. It is now known that "the osmotic pressure is exactly the same as the gas pressure which would be observed if the solvent were removed and the dissolved substance were left filling the same space in the gaseous state at the same temperature." There is a constant relation between the osmotic pressure, the freezing point, and the vapor tension of substances of the same molecular species.

Nernst says that "the question as to how the nature of the sol-

vent influences the osmotic pressure of the dissolved substance is at once settled by the fact that insomuch as it is identical with the gas pressure there is no dependence at all between the osmotic pressure and the solvent." Which fact is easily demonstrated.

The laws governing the phenomena of osmosis are very clearly understood, and so perfected that the exact constancy and temperature coefficient are known for a large number of substances.

Time will not permit of anything but the most hurried *résumé* of the laws governing osmosis, but from even the few just quoted we can make some valuable deductions as to the *rôle* this force plays in the process of cataphoresis.

Since the nature of the solvent has nothing to do with the osmotic pressure, it at once becomes obvious that,—

First. It does not matter what solvent we use for our cocain, provided it is the force of osmosis that accomplishes the work.

Second. Since the osmotic pressure is in direct proportion to the concentration, the solution should be as nearly saturated as possible.

Third. Since the osmotic pressure is increased to a definite extent by each degree increase of heat, the solution should be kept as hot as possible.

These above observations hold good for practical application *if* the force we are dependent upon is osmosis. We can make our deductions both from a clinical and theoretical standpoint. Will osmosis carry cocain into dentin to any considerable extent? To answer this, I have sealed a saturated solution of cocain into cavities for two days and again for two months without producing anesthesia except on the very surface of the cavity. I have also applied it for some time on an exposed pulp, and could not cut very far into it. Sulfate of strychnia and bichlorid of mercury applied on cotton to the chest of frogs produced no physiological effect, while with a current death was produced in a few minutes. This at one stroke seems to answer the question as to whether osmosis alone can produce this condition.

Now for the theoretical suggestions. We know that if a saturated solution of cocain be placed in a cavity there will be a difference of concentration between the cavity and dentin and the cavity and pulp. We know also that the velocity of migration of the dissolved salt will depend on two things: the osmotic pressure or "head," and the resistance. We have all observed how slowly a very fine precipitate settles. This is the resistance of the solution. Just so the resistance of any solvent to any dissolved substance can be determined from the osmotic pressure and velocity.

Now, as a matter of fact, all cell-tissue and porous partitions offer great resistance to osmosis, and many cells have the power of permitting some substances to pass, while excluding others. This is the foundation of plant-life physiology, and largely of our own physiology. It is for this reason that some bacteria are so difficult of destruction.

In the dentin we have both of these conditions, and it would be expected that a very great barrier would exist here to the osmosis

of the cocain. So far as I know, no scientific study has been made of dentin in this connection. It is a good field for some one.

We are forced to conclude, from the clinical observations and theoretical probabilities, that osmotic pressure is not the force on which depends the transmission of cocain through dentin into the pulp. This brings us to a consideration of the last question,—viz,

What are the laws of electrolysis?

What is electrolysis?

"It is the change that is effected by the passage of an electric current, in so far as the electricity exhibits itself as such." How is electricity conducted? As expressed by Nernst and translated by Palmer, "The conveyance of electricity in conducting substances may happen in two different ways,—viz, *with* or *without* the associated transportation of matter. The latter happens in the case of metallic conductors (first class), the former in electrolytic conductors (second class); hence these are called conductors of the first and second classes respectively."

The nature of conduction in the first class (metallic) is unknown, but the nature of conduction in the second class, namely, electrolysis, is quite perfectly understood. From the above author I quote that "The process of the conduction of a current, as a result of electric forces, consists in the displacement of free ions." "By free ions we mean those which are not united with each other to form electrically neutral molecules; the positive ions migrate in a direction from anode to cathode, the negative ions in the opposite direction."

A solution conducts electricity the better the more numerous the ions and the smaller the friction which the ions encounter in their migration. This conception may be applied unchanged to every substance which conducts electrolytically,—whether gaseous, liquid, or solid, whether simple or mixture. Insomuch as it is impossible for a weighable quantity of a substance to consist solely of positive or negative ions,—because this would signify the accumulation of such immense quantities of electricity that the substance would at once be dissipated, in consequence of the repulsion,—therefore only *compound substances*, but no elements, have the property of electrolytic conductivity. Moreover, the molecules of the conducting substances must be dissociated in order that there may be free ions present; *and the free ions are divided into two classes, which are sharply contrasted*, accordingly as they are positively or negatively charged.

The electrolytic charges of the ions are equally great and equivalent, whether they occur in solution or in substances having a simple composition. This would be anticipated, because the fundamental laws of Faraday hold good both for water solution and also for fused salts. It is very remarkable that *we do not know of any electrolyte which in the pure state and at ordinary temperatures has the power of electrolytic conductivity to any marked extent.* Thus, *e.g.*, neither liquid hydrochloric acid nor pure water can conduct electricity noticeably; but when they are mixed they become conductors. The reason for this certainly is not that the ions in the

pure liquid experience too great a resistance to their movement, but rather that the liquid electrolytes in the pure state are dissociated only to the very slightest extent. In the passage of a current through any liquid, then, except a metal, the current can pass only by dissociating some of the molecules, called the ionization of the medium, and these ions, which are equal in quantity, migrate in their respective directions. The measure of the ions traveling in either direction is the exact measure of the ions traveling in the other direction and the measure of the current flowing.

This is expressed by Nernst as follows: "When the galvanic current passes through conductors of the second class,—viz, electrolytes, then, in addition to the liberation of heat, there occurs a transportation of matter,—migration of the ions,—and also on the limiting surfaces between the conductors of the first and second classes there occur peculiar chemical processes; these latter consist primarily in the solution of the electrodes or in the separation of the ions from the electrolytes, but they are usually complicated by secondary reactions between the electrolyte and the separated products."

This latter phenomenon, with associated reactions, has been by some thought to be a movement of solid particles.

The quantity of the ion separated in a unit of time upon the electrode is proportional to the intensity (strength) of the current, and the same quantity of electricity will in the most various electrolytes electrolyze chemically equivalent quantities of ions. In those cases where the chemical value of the ions is capable of changing, of course the meaning of *chemical equivalents* changes; thus, the same current which separates two hundred grams of mercury from a solution of $Hg\ (NO_3)_2$ will separate one hundred grams of mercury from a solution of $HgCn_2$. The above author says, "It is only in the rarest cases that the ions themselves are obtained as the product of electrolysis,—*i.e.*, products which have the same composition as the ions as they are primarily separated, which differ from the ions only by having given up their electric charges. Thus the hydrogen ions appear in the form of H_2, the ions of certain metals in the form of metals, and under suitable conditions the ions of the haloids (viz, acidiferous elements) in the form of metaloids." "But much more frequently the ions either act upon each other on being separated, as, *e.g.*, in the decomposition of the acetic acid ion according to the equation,—

$$2\,CH_3\,COO = C_2\,H_6\,CO_2,$$

producing ethane and carbon dioxid; or the ions may react upon the water as when separated sodium gives off secondary hydrogen, or, finally, the ions may react *upon the metal of the electrode*, as when separated chlorin forms the respective chlorid" (or when graphite is put in a silicate of soda solution).

The (freshly separated) ions, which have been deprived of their charges by the aid of the passage of powerful electric energy, are illustrations of substances containing a large quantity of free energy,—that is, illustrations of great affinity. The (freshly separated) ions are capable of performing reactions of which they are

quite incapable in the ordinary state. Thus, for example, freshly separated hydrogen, unlike ordinary hydrogen, can reduce nitric acid,—the so-called "nascent state." It is especially worthy of our notice here that electrolytic dissociation as compared with ordinary dissociation is influenced but slightly by temperature. In fact, it sometimes happens that with rising temperature it diminishes, or it may slightly increase, which is in strong contrast with ordinary dissociation, which always rapidly increases with rise of temperature.

Let us now apply some of these laws of electrolysis to the particular process with which we are interested. Suppose the positive pole to be applied to the dentin of a tooth and the negative to the cheek. An interposing layer of medicament, say cocain in water solution, is between the metallic positive electrode and the dentin. Now the only way electricity can get from the metallic positive electrode to the metallic negative electrode is by the dissociation of some of the molecules in every substance of the second class through which it passes. In every part of the course, through the cocain solution, the dentin, the pulp, the connective tissue, the blood-vessels, the muscle-tissue, and the sponge on the negative electrode, there will be a cleavage of some of the molecules of the various chemical compositions into a positive and a negative ion. These ions, with equal force and chemical equivalents, start on their respective journeys toward their opposite poles. They meet with friction which varies for different ions, and since they have the same force behind them, pushing them, their velocities will vary with their resistance. If in their course they meet a new ion or an element or compound for which they have a greater affinity than the force which separated them, they will unite with it until they are again called into service. Unless an ion found such an affinity it would keep on going until it got to the metal plate of the negative electrode, and, if it could unite with it, would do so; if not, would be deposited upon it or be liberated in the form of gas.

Now the question we have heard raised so often, Is the current we use strong enough to produce any electrolysis? must be settled, for if we have no electrolysis we cannot have any current flowing, and the measure of the current is the measure of electrolysis, and *vice versa*. In the case above the hydrochlorid of cocain would probably be broken up as follows: The acid radical will be negatively charged and will go to the positive pole, and the alkaloid will be positively charged and will go to the negative pole. As it passes into the tissue it will doubtless meet ions of oxygen coming toward the positive pole, and at once there will be formed in the tissue a new product, a compound of cocain. Now it is a fact that only a small per cent. of the molecules will ionize or dissociate; hence we see why there has been practically no difference in the effect we observed from using a saturated solution of cocain or a one per cent. solution.

Here again we can make our deductions both from clinical observations and theoretical calculation.

I have observed the following results by applying the cocain solution as stated above:

First. In nearly fifteen hundred cases of which I have kept a record (and in many a complete record of the ampereage, the voltage, and the resistance at both the beginning and the ending of the operation; also the time, size of cavity, and medicine used), the per cent. of perfectly successful cases has been between 95 and 100; and of late, with the increase of experience, all cases have been successful on the second application, if not on the first. Of these fully one hundred were cases in which the pulp was entirely removed at the time, and in about two hundred more the pulp was drilled into and partly removed and a devitalizing agent used to complete the destruction.

Second. In almost all cases of single-rooted teeth the pulp was entirely removed at the time.

Third. No sensation of pain was felt from the devitalizing agent applied after using cataphoresis.

Fourth. Not a single case, as yet, of a dead pulp from the use of cataphoresis.

Fifth. No difference has been noted in the time required for different concentrations of cocain or any other agent.

Sixth. The average time required was about thirteen minutes.

Seventh. The amount of current tolerable in a case of unexposed healthy pulp is determined by the effect of the current on the pulp-tissue and not on the dentin.

Eighth. The resistance through the wet dentin varies all the way from a few thousand to five hundred thousand ohms.

Ninth. The amount of current tolerable has been found to vary from one two-hundred-thousandth of an ampere to two-thousandths of an ampere, the average being less than two ten-thousandths at the beginning of the operation and four ten-thousandths at the finish. Of course, where pulps were devitalized a very much stronger current was used for the finish, but seldom more than that amount was used where the continued life of a pulp was expected.

Tenth. There are no constant symptoms that will give any indication of the amount of current flowing. Each case has a different pain limit; hence the *absolute* necessity of using a milliamperemeter.

Eleventh. No effect has ever been noted in the tissues beyond the tooth except where a very strong current was used; then slight periostitis.

What deductions can we make from the above clinical results? And the foregoing laws of nerve excitability, the laws of osmosis, and the laws of electrolysis?

We know that when a solution of cocain is supplied to the dentin of a tooth under the positive pole, with a negative elsewhere, we do get anesthesia not only of the dentin, but of the pulp-tissue, if applied long enough.

Will the current alone produce this condition? Answer, *No.*

Then it is not the current that does the work.

Will the medicine alone produce this condition? Answer, *No.* Then it is not a simple osmosis.

Does the current so applied produce any change in the cocain solution? Answer, *Yes.* It cannot pass through it except by changing it.

Is there a transmission of matter in this solution under these conditions by simple osmosis? Answer, probably very slight.

Is there a considerable transmission of matter at all? Answer, *Yes*, by the migration of the ions.

Do these ions produce currents which carry the unchanged medicine with them? Theoretically, yes, but practically, *very* slight.

Are these currents produced in both directions? Answer, *Yes.*

Can an osmosis be produced from a negative to a positive pole? Yes, in some solutions. (An analogous phenomenon is observed, though by a different force, when a globule of mercury is placed between two electrodes in water; the globule goes to the positive pole.)

According to the older theories, there was supposed to be a physical force exerted in some manner by the electric current applied in this manner, and this theory has its advocates yet. There is a newer theory, however, which is made by its introducer to explain all the phenomena. Its author is Nernst, of Göttingen, Germany. He maintains that there is no transmission of matter except the ions themselves. Of course, the accumulation of the ions at the electrodes will produce a difference of concentration of the products they form, which would set up osmotic currents. These are granted, but there is a different opinion as to their strength, which is probably extremely slight.

Now to follow this same argument in this connection, if it is the force of osmosis on which we are dependent, what will be the effect of the new molecules of hydrochlorid of cocain formed in the pulp-tissue by electrolysis on the osmosis from without? Of course, if such is formed it would diminish the difference of concentration within and without the pulp-chamber, and by doing so would lessen the force of the osmotic pressure, which is in direct proportion to the difference of concentration at different points. In this case it would not seem that the current was helping the process. It is certain that we are not dependent on a difference of concentration for the development of the force that carries the cocain through the tissue. Do we know that a medicament can actually be forced into the pulp at all? Answer, yes, in many ways. I have put sulfate of morphin with the cocain, and after extracting the pulp on a broach been able to detect the morphin by the nitric acid test under the microscope. I have killed a frog in twenty minutes with sulfate of strychnin with the current, when neither the current alone nor the medicine alone, left for a considerable time, produced any noticeable effect. I do not believe the medicine was in any case carried in as the original chemical species, but was changed by electrolysis; and further, with the conditions under which we use cataphoresis, I believe the

forces upon which we are dependent are the dissociation of the molecules and the increased energy of these dissociated products. These ions, by their increased energy, by their migration, and by the new chemical species they form, are capable of producing just such phenomena as are produced in cataphoresis, as will be seen by this simple experiment.

The final goal is, of course, to diminish the time. I do not believe this will be done by seeking directly for a substance that has a high osmotic pressure, but rather by seeking for a reaction that will produce the most active ion. It is true, however, that substances that have a high osmotic pressure have good conductivity. Since the amount of current we can use is limited by the pain limit of the tissue, and the amount of electrolysis is a constant expression of the strength of current, of course the amount of chemical energy we can liberate is fixed, and we cannot hope to change this unless we can change some of the laws of either *physiology, electrolysis,* or *chemistry.* We have left these unfixed conditions to modify,—viz, to select the ions with greatest migration velocity, and which themselves, or the compounds which they will form, will produce the greatest physiological effect upon the tissue for the same unit of concentration in the tissue. There is no reason why great advancement should not be expected along this line, and it is my opinion that when it does come it must come along this line.

I am indebted for valuable references to Professor Morley, of the Western Reserve University; Professor Miller, of the Case School of Applied Science, and Professor Herdman, of the University of Michigan.

CORRESPONDENCE.

Regulating Methods.

To the Editor of the Dental Cosmos:

Sir,—On page 11, *Items of Interest*, January, 1897; also Richardson's "Mechanical Dentistry," seventh edition, page 426, appears the following: "So far as we can find in the records, this is the first use of a double interdental splint,—bringing the jaws into close occlusion and abandoning the theory of feeding space," etc.*

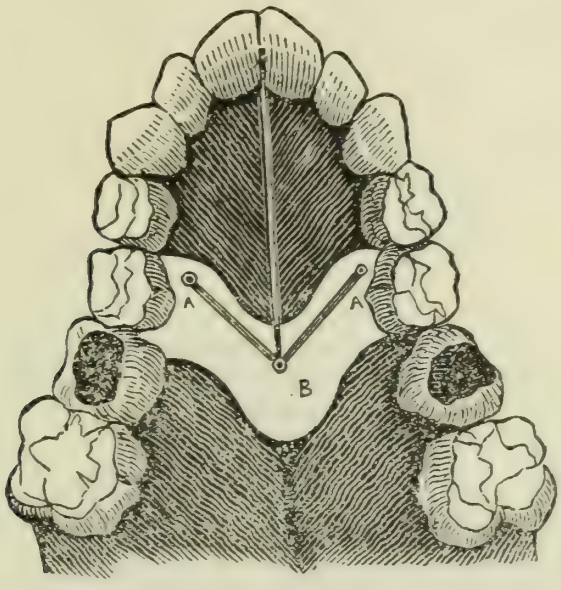
I would call attention to an article published in the *Dental News Letter*, October, 1858, pages 78, 79, 80 of "A Case of Fracture of the Lower Jaw at its Neck," reported by M. O. Heydock, M.D., of Chicago, Ill. "The fracture was evidently at the base of the left condyle; crepitus was very marked and distinct, and deformity arose from a swaying of the jaw to the left, owing as I suppose to the contraction of the pterygoid muscle." The splint used was made by Dr. Allport, of Chicago, Ill. It was of gold, being a double interdental splint without feeding space; full description and illustration of model and splint are given.

*Dr. Ottolengui.

"Dr. Allport suggested that a thin layer of gutta-percha should be placed inside the caps which might by its presence as a lining prove less irritating than the plates alone, while at the same time it would more perfectly adapt itself to the inequalities of the surfaces than the metal. This, after being softened in hot water, was placed within the caps and then placed *in situ* while it was soft and pliable, and as hot as could well be borne. The patient was then directed to shut the jaw naturally, and it was then firmly pressed home and immovably fixed."

The method used by Dr. Allport in 1858 has been constantly employed ever since, excepting that rubber has been substituted for gold. Very often the splint has been made of gutta-percha.

FIG. 1.



DENTAL COSMOS, February, 1897, page 143:

"Dr. R. Ottolengui spoke of the difficulty of retracting the lower jaw. In the text-books a method is described of exerting pressure through a chin-piece for this purpose; but he thought it would not be possible to affect the shape of the bones by such means, as the pressure on the chin would be unbearably painful after a short time. In one case that came to him for treatment the jaw was bent in such a way that it was impossible to bring the anterior teeth together. An effort had been made to force the jaw up by pressure, but the pain was too great, and Dr. Ottolengui had suggested a method *that had not yet been tried.* The intention is to remove the second bicuspid on each side and saw out a triangular section of the jaw-bone, including the sockets of these teeth, then make a splint to retain the parts in their proper position till the bone unites. He had assisted in a similar operation for cancer, where the jaw-bone was sawed quite in two. *An original* splint was made from metal dies of both jaws, with a complete cap for the teeth; the splint was cut away to expose all of the six front teeth. After the splint was made ready, the operation was performed and the jaw divided. It was then placed in position with the splint holding it firmly to its place. The patient was fed for three weeks through a tube, when the bone was found to be united, the parts all healed up, and perfect occlusion of the teeth secured. Soon after this operation the patient with the deformed jaw spoken of came along, and though the operation was thought to be perfectly feasible the patient would not as yet consent. The operation would be to make a model of the lower jaw as it should be, and to make the splint from the model, then cut the jaw and put in the splint."

Extracts from a case reported in the *American Journal of Dental Science*, January, 1849, of a "Case of Elongation of the Under Jaw and Distortion of the Face and Neck caused by a Burn" (eight

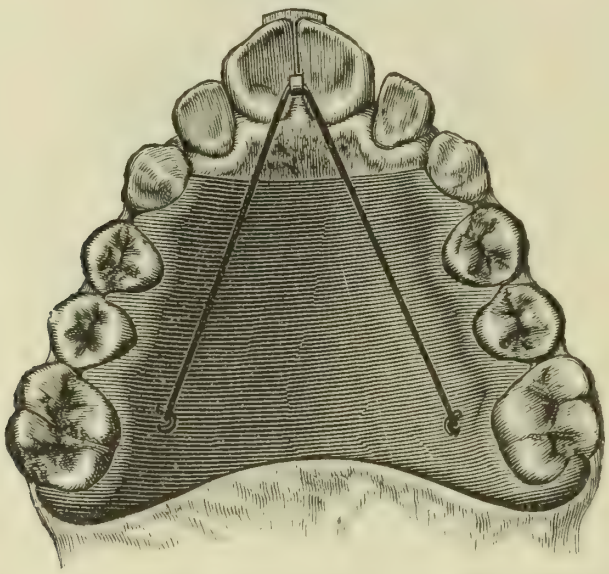
illustrations), successfully treated in the spring of 1848 by Dr. S. P. Hullihen, of Wheeling, Va.:

"To remove the projection of the under jaw seemed to require the first attention. Unless that could be done the other operations, however successful, would add but little if any to the personal appearance of the patient. This lengthening of the jaw had taken place entirely between the cuspidatus and first bicuspid tooth of the right side, and between the first and second bicuspids of the left. By this elongation the teeth just described were separated on both sides about three-fourths of an inch. To saw out the upper edge of these elongated portions of the jaw, and then to divide that part of the jaw in front of the spaces thus made, by sawing it through in a horizontal manner, so as to permit the upper and detached portion to be set back in its proper and original position, appeared to be the only possible way of remedying the deformity.

"This plan I therefore adopted, and performed the operation on the twelfth day of June in the manner now to be described.

"The operation was commenced by sawing out in a V-shape the elongated portions, together with the first bicuspid on the left side, each section extending about three-fourths of the way through the jaw. I then introduced a bistoury at the lower point of the space from which the section

FIG. 2.



was removed on the right side, and pushed it through the soft parts close to and in front of the jaw, until it came out at the lower point of the space on the left side. The bistoury was then withdrawn and a slender saw introduced in the same place, and the upper three-fourths of the jaw containing the six front teeth was sawed off on a horizontal line ending at the bottom of the spaces before named, the detached portions being still connected on the outer and inner sides to the jaw below by the soft parts. After having with the bone nippers removed from the detached portion the corners which were created by the horizontal and perpendicular cuts of the saw, it was set back so that the edges from which the V-shaped sections were removed came together as represented.

"Thus it will be perceived that this portion of jaw and teeth which before projected and inclined outward now stood back and inclined inward and in its proper and original place.

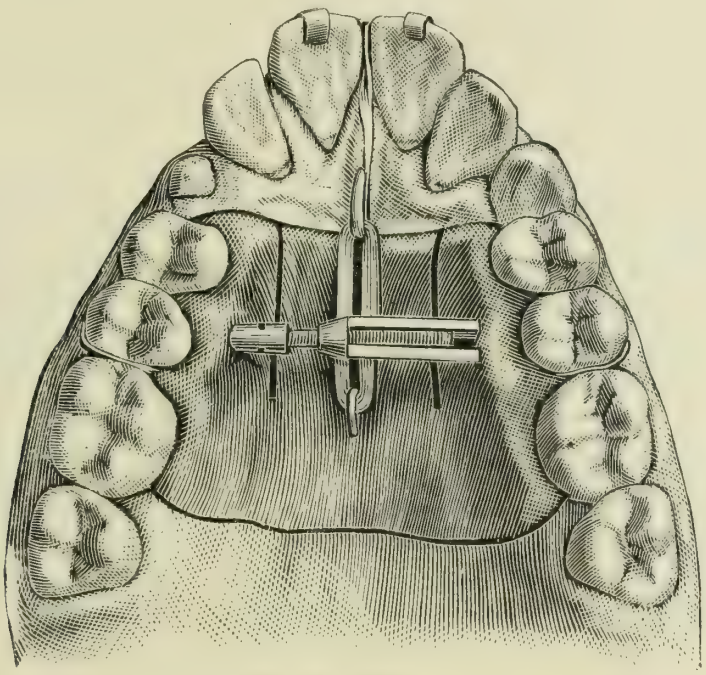
"In this position the jaw was secured by passing ligatures around the cuspidati in the detached portion and the now adjoining bicuspids in the sound portion. Then taking an impression of the jaw in very soft wax, a cast was produced and a silver plate struck up and fitted over the teeth and gums in such a manner as to maintain the parts in that same relation beyond the possibility of movement."

I am fully convinced that the course pursued by Dr. Hullihen of

ligaturing around the teeth of "the detached portion to the teeth of the sound portion," and then taking impressions, is better practice than taking the impression before the operation and constructing the appliance *"on a model of the lower jaw as it should be."* It is next to an impossibility in a case like the one reported by Dr. H. to remove the same amount of bone as represented by the corrected plaster model, and make an appliance capping the teeth that will go into place.

In a paper read before the New York State Dental Society by Eugene S. Talbot, M.D., D.D.S., and published in the DENTAL COSMOS, 1892, page 785, will be found the following:

FIG. 3.



"While dentistry has been practiced in this country for more than a century, I have been unable to find a single mention of the correction of any of the constitutional forms of irregularities prior to the year 1859, at which time mention was made by Dr. Westcott in an article upon the subject of what he denominated 'Expansion of the Upper Dental Arch.' Brief mention has been made of the cause of these deformities, however, as early as 1825. This shows that while the very able practitioners at that time were well versed in theories and the plans of operations then in vogue, they had written little and accomplished less in the line of invention of mechanisms for the correction of such deformities. In this alone may we not see some evidence that aberrations in the jaws and teeth were then uncommon, or else they were regarded as impossible to correct. Since that time, however, we know that the knowledge of treatment for correction of irregularities has increased rapidly and that it has now become a specialty."

Attention is called to an article published and fully illustrated by Dr. W. H. Allen in the *New York Dental Recorder*, 1850.* The authors of text-books have evidently overlooked this case:

"Case 4.† Irregularity of the teeth in both jaws of a young lad aged thirteen years. This was a very uncommon and complicated case, the teeth in both jaws being much crowded, and ten in each requiring to be moved,

* Nine years prior to Westcott, according to Talbot.

† Page 127, Fig. 1.

some of them to the extent of three lines. The accompanying drawings show the state of the mouth when the patient was confided to my care. In the superior maxillary the anterior molars of each side were much decayed, and it was found necessary to remove them. By this means sufficient room was afforded for the remaining teeth when they should be reduced to their true position. In order to obtain more space for the tongue, which important member it is necessary should move as free from impediment as possible, I was obliged not only to enlarge the space between the teeth of the opposite sides of the mouth, but also to express the whole alveolar process of the upper jaw. To effect this a plate of gold following the palatine arch, which was very deep, from one side to the other, was affixed to the bicuspids of each side by clasps. This plate was so made that when attached to the teeth it should constantly press them, and the alveolar process outward toward the cheeks. To keep up a constant outward pressure two gold wires were attached to the plate, which hinges at AA, meeting and forming nearly a right angle at B, where was fastened a strip of caoutchouc, which being passed between the median incisors, drawn tight, and fastened, produced the double effect of widening the palatine arch and of pulling back the incisors, which projected too far by two or three lines. (Fig. 1.) This apparatus was kept on and occasionally tightened for several weeks."

The hinge in connection with the caoutchouc employed by Allen for expanding and retracting of the dental arch must have been one of the methods in use prior to that of the jack-screw.

It is fully demonstrated by illustrations from Kingsley's Oral Deformities, page 97, Fig. 39, 1880 (Fig. 2), DENTAL COSMOS, page 103, Fig. 12, 1892 (Fig. 3), that the principle and method of expansion and retraction of the upper dental arch published by Allen have been accepted. It is of interest to know that Allen used caoutchouc (elastic rubber) for the double effect of retracting and expanding the jaw prior to 1850.

KASSON C. GIBSON.

NEW YORK CITY, N. Y.

PROCEEDINGS OF SOCIETIES.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE fourteenth annual meeting of the National Association of Dental Faculties was held at the Hygeia Hotel, Old Point Comfort, Va., commencing Friday, July 30, 1897.

The following members of the association were represented as noted below:

Alabama Dental College, Birmingham, Ala.—T. M. Allen.

University of California, Dental Department, San Francisco, Cal.—L. L. Dunbar.

Columbian University, Dental Department, Washington, D. C.—J. Hall Lewis.

Howard University, Dental Department, Washington, D. C.—A. J. Brown.

National University, Dental Department, Washington, D. C.—J. Roland Walton.

Atlanta Dental College, Atlanta, Ga.—William Crenshaw.

Dental Department of Southern Medical College, Atlanta, Ga.—S. W. Foster.

Chicago College of Dental Surgery, Chicago, Ill.—T. W. Brophy, Louis Ottofy.

Northwestern University Dental School, Chicago, Ill.—Theo. Menges.

State University of Iowa, Dental Department, Iowa City, Iowa—W. S. Hosford.

Louisville College of Dentistry, Louisville, Ky.—H. B. Tileston.

Baltimore College of Dental Surgery, Baltimore, Md.—M. W. Foster, B. Holly Smith.

University of Maryland, Dental Department, Baltimore, Md.—F. J. S. Gorgas.

Boston Dental College, Boston, Mass.—J. A. Follett.

Harvard University, Dental Department—Thomas Fillebrown.

Dental College of the University of Michigan, Ann Arbor, Mich.—J. Taft.

University of Minnesota, Dental Department, Minneapolis, Minn.—W. P. Dickinson.

Kansas City Dental College, Kansas City, Mo.—J. D. Patterson.

Western Dental College, Kansas City, Mo.—D. J. McMillen.

Marion-Sims College of Medicine, Dental Department, St. Louis, Mo.—J. H. Kennerly.

Missouri Dental College, St. Louis, Mo.—A. H. Fuller.

University of Buffalo, Dental Department, Buffalo, N. Y.—W. C. Barrett.

New York College of Dentistry, New York City—F. D. Weisse, J. Bond Littig.

Cincinnati College of Dental Surgery—G. S. Junkermann.

Ohio College of Dental Surgery, Cincinnati, Ohio—H. A. Smith.

Western Reserve University, Dental Department, Cleveland, Ohio—George H. Wilson.

Pennsylvania College of Dental Surgery, Philadelphia, Pa.—C. N. Peirce.

Philadelphia Dental College, Philadelphia, Pa.—S. H. Guilford, Leo Greenbaum.

University of Pennsylvania, Dental Department, Philadelphia, Pa.—James Truman.

Tennessee Medical College, Dental Department, Knoxville, Tenn.—R. N. Kesterson.

Central Tennessee College, Meharry Medical Department, School of Dentistry, Nashville, Tenn.—G. W. Hubbard.

University of Tennessee, Dental Department, Nashville, Tenn.—J. P. Gray, L. G. Noel.

Vanderbilt University, Dental Department, Nashville, Tenn.—H. W. Morgan.

University College of Medicine, Dental Department, Richmond, Va.—L. M. Cowardin.

Royal College of Dental Surgeons, Toronto, Canada—W. E. Willmott.

The following schools were elected to membership:

Milwaukee Medical College, Dental Department, Milwaukee, Wis., represented by Reinhold E. Maercklein.

Tacoma College of Dental Surgery, Tacoma, Wash., the constitution being signed by proxy by Dr. Kennerly.

New York Dental School, New York City, represented by John I. Hart.

Ohio Medical University, Dental Department, Columbus, Ohio, represented by J. F. Baldwin.

Baltimore Medical College, Dental Department, Baltimore, Md., represented by J. W. Smith and William A. Montell.

The application for membership of the University of Omaha, Dental Department, was laid over till next year, at the request of its officers.

Applications for membership were reported by the Executive Committee from the Pittsburg Dental College, Pittsburg, Pa.; Dental Department of the College of Physicians and Surgeons, San Francisco, Cal.; University of Colorado, Dental Department, Denver, Col.

The following report laid over from last year was adopted:

"Your committee on choosing a color respectfully report that they have decided to recommend the standard lilac as the distinctive dental color, and they recommend the adoption of the academic costume according to the requirements observed by the intercollegiate system."

The resolutions laid over from last year, making the annual college term seven full months, and recommending that the annual meetings be held in connection with the National School of Dental Technics, and at a time of the year when the colleges are in session, were negatived.

A committee, consisting of Drs. Henry W. Morgan, M. W. Foster, Theo. Menges, C. N. Peirce, and H. A. Smith, was appointed to meet a similar committee from the National Association of Dental Examiners, for the purpose of harmonizing the differences of opinion between the two associations. This committee reported rules which had been agreed upon by the two committees.

The report was discussed at length and again referred to the committee, which later reported, through the Executive Committee, a resolution, which was adopted, providing for the codifying and arranging of the existing rules of the association, and the preparation of such additional rules as may be deemed advantageous to both organizations in advancing the standard of dental education in the United States. On motion, the committee which had had the matter in charge in the conference was continued for this purpose.

A communication from the Dental Department of the State University of Iowa was received, asking consent of the association to its conferring the honorary degree on Dr. F. P. Webber, of Cherokee, Iowa. The request was declined on the ground that it is contrary to the practice of the association.

A similar communication from the University College of Medicine, Dental Department, Richmond, Va., asking the privilege of conferring the *ad eundem* degree on Dr. Thomas G. Cowardin, of London, Eng., was refused upon the same grounds.

The rule regarding preliminary qualifications adopted in 1896 was declared to have been adopted in an unconstitutional manner, and was therefore rescinded. The following was adopted in its place, and by unanimous consent was ordered to go into effect at once:

Resolved, That the minimum preliminary education requirement of a college of this association shall be a certificate of entrance to the first year of a high school or—in states that have no high school—of graduation from a grammar school, or its equivalent, to be determined by an examination.

Resolved, That nothing in the above shall be construed to interfere with colleges of this association that are able to maintain a higher standard of preliminary education.

A communication was read from Dr. W. Mitchell, president of the American Dental Club of London, requesting the appointment of a committee to co-operate with a similar committee in Europe for the purpose of securing just recognition of the diplomas issued by the colleges belonging to the association. The communication was favorably considered, and the president appointed as the committee Drs. W. C. Barrett, D. J. McMillen, S. H. Guilford, A. H. Fuller, and Faneuil D. Weisse.

The Ad Interim Committee reported that one new question decided by them during the year was that a student who was in arrears for fees could not be accepted by another college if objection was made by the college to which he was indebted. This ruling was sustained by vote of the association.

The committee also recommended that steps be taken to secure definite knowledge as to the curricula and requirements of foreign colleges, so that the members of the association should be able to decide upon the standing of students coming from them. Referred to the committee appointed to consider the matter of Dr. Mitchell's letter.

A paper prepared by Dr. W. C. Barrett, Buffalo, N. Y., at the request of the Executive Committee, and entitled "The Study of Anatomy," was read by its author.

The paper was, on motion, directed to be sent to the journals for publication.

A committee, consisting of Drs. S. H. Guilford, Theo. Menges, and M. W. Foster, was appointed to select persons to prepare papers on subjects connected with the work of the association, to be read before the next meeting.

Dr. Barrett offered the following, which was adopted:

Resolved, That the final vote upon the admission of a college to this association shall not hereafter be taken unless a duly certified and qualified delegate is in attendance.

The following, offered by Dr. L. L. Dunbar, was adopted:

Resolved, That in order to maintain a reputable standing in this association no college under its jurisdiction shall permit any member of its faculty or teaching staff, board of trustees, or stockholders to serve in a judicial capacity as a member of a state board of examiners.

Dr. Taft offered the following, which was adopted:

Resolved, That a committee of three on curriculum be appointed, whose duty it shall be to compare the schemes of study of the various dental colleges, with the view of harmonizing these schemes and making them as nearly alike as practicable, to report next year.

The Committee on Text-Books recommended the following:
Essig's "American Text-Book of Prosthetic Dentistry."
Hodgen's "Dental Metallurgy."
Schafer's "Essentials of Histology," fourth edition.
Abbott's "Principles of Bacteriology," third edition.
Gray's "Anatomy," last edition.
Luff's "Manual of Chemistry."
Burchard's "Compend of Dental Pathology and Therapeutics."

The report was adopted, and the committee was instructed to examine Kirk's "American Text-Book of Operative Dentistry," and Marshall's "Injuries and Surgical Diseases of the Face, Mouth, and Jaws," and forward their views at the earliest possible moment to the secretary, in order that they may be incorporated in the printed Transactions.

A committee, consisting of Drs. M. W. Foster, William Crenshaw, and L. G. Noel, reported appreciative resolutions on the death of Drs. Frank Abbott and Francis Peabody, late members, who have died since the last meeting was held. The resolutions were adopted.

The following lie over for final action till next year:

Offered by Dr. H. W. Morgan, seconded by Dr. H. B. Tileston:

Resolved, That on and after the session of 1899-1900, the regular sessions of each college belonging to this association shall be extended to four years.

Dr. J. Taft moved to amend the constitution to require applications for membership to be sent to the secretary of the Executive Committee instead of to the secretary of the association.

Offered by Dr. T. Fillebrown:

Resolved, That no college connected with this association shall confer any degree as honorary which is usually granted in due course of study and examination. All former rules on the subject are hereby repealed.

Offered by Dr. Barrett:

Resolved, That after the regular session of 1898-9 the annual college term for the members of the association shall be seven full months.

Dr. Crenshaw moved to strike out Rule 3 and adopt the following instead:

Resolved, That the time in which students can enter schools of this association shall be the first ten days of the session of the school, dating from the time announced in its catalogue.

The following were elected officers for the ensuing year: T. W. Brophy, Chicago, president; D. J. McMillen, Kansas City, Mo., vice-president; J. H. Kennerly, St. Louis, Mo., secretary; H. W. Morgan, Nashville, Tenn., treasurer. J. Taft, Cincinnati; Thomas Fillebrown, Boston, Mass.; B. Holly Smith, Baltimore, Md., Executive Committee. James Truman, Philadelphia; F. J.

S. Gorgas, Baltimore; J. Hall Lewis, Washington, D. C., Ad Interim Committee.

The newly elected president, on being installed, announced the following appointments: J. A. Follett, Boston, Mass.; H. A. Smith, Cincinnati, Ohio; L. L. Dunbar, San Francisco, Cal.; J. D. Patterson, Kansas City, Mo.; W. T. McLean, Cincinnati, Ohio, Committee on Schools. S. H. Guilford, Philadelphia, Pa.; William Crenshaw, Atlanta, Ga.; W. C. Barrett, Buffalo, N. Y.; W. P. Dickinson, Minneapolis, Minn.; Faneuil D. Weisse, New York City, Committee on Text-books. J. Taft, Cincinnati, Ohio; Edward C. Kirk, Philadelphia, Pa.; A. H. Fuller, St. Louis, Mo., committee to select subjects and essayists for next meeting.

Adjourned to meet at the call of the Executive Committee.

SEVENTH DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK.

(Concluded from page 566.)

SECOND DAY—*Afternoon Session.*

THE session was called to order at 2.30 P.M., and Dr. J. WRIGHT BEACH, of Rochester, read the following paper:

DENTO-MAXILLARY STRUCTURES AS EXPONENTS OF CHARACTER.

Those mysterious vital forces of creation, which produce the wonderfully differentiated animated beings which inhabit the earth, are subservient to strict and infallible laws, and there exist the most harmonious relations between them all.

Certain physical forms have been, since the beginning of creation and always will be, accompanied by distinguishing characteristics. We would scarcely expect to find concealed within the heavy, coarse, and angular outlines of the tiger, the gentle, retiring disposition suggested by the delicately graceful form of the fawn. Thus may we trace from the lowest form of animated existence step by step, graduation to graduation, until is reached that zenith of creation, man, who represents perfection of differentiation and an exhaustless series of developmental changes, consequent upon the survival of the fittest.

These laws are immutable, and although comparatively few in number, are subject to innumerable combinations, which fact explains why we are each possessed of different physical and mental attributes, and also are responsible for that distinguishing quality known as individuality. Man has thus found himself subject and heir to these laws through heredity. He must bow in submissive obedience, accept his environment, and instead of deprecating should rather endeavor to more fully interpret the operations and understand the combinations to which nature's laws are subject.

The basis and fundamental principles governing the study of character are dependent upon the mastering of the affiliations of these primal mandates. He who hopes to disclose the individual proclivities and attributes by adhering to the basal principles alone

will meet with the most profound disappointment. It is possible, perhaps, to indicate in this way the strongest inherent tendencies of one's nature, but for the actual determination of the various attributes which go to form individual character, reference must be had to these separate laws in their various combinations. As in phrenology, for instance, a subject may possess the selfish faculties strongly developed and yet might display characteristics of a reverse nature, because of the overpowering influence of the benevolent group through greater development.

In the Middle Ages there originated a mode of discriminating character by the outward appearance. This mode has gradually developed into the universally accepted science of physiognomy. So much faith and reliance has been placed in its signs, that the number of intelligent people who to-day discredit the belief that the good and evil passions by their continual exercise do not stamp their impress upon the face is exceedingly diminutive.

Later was conceived by Gall and developed by his followers that empirical system of psychology, which, since early in the present century, has been characterized as phrenology. While the popularity of this so-called science has waned and its present advocates and followers are comparatively few, yet certain parts will survive and become incorporated into scientific psychology, while the rest will in due course come to be relegated to the limbo of effete heresies.

Therefore it is seen that we have special departments of science whereby character may be determined by certain signs of the cranium and face respectively: the external osseous formation of the head and the soft tissues covering the bones of the face.

Thus we recognize a most important territory almost entirely unconsidered,—that of the maxillary bones and the teeth which they support. And are they not of sufficient importance as factors in the formation of individual character to demand special consideration? To endeavor to prove that such is the case is my mission before you to-day.

Granting beforehand that the theories and conclusions herein presented may, in a measure, be disproved, this study cannot but broaden the mental vision in a degree, and as well help us as conservers of these organs so grandly designed by nature to respect them still further and look upon the destruction of their lines, each one of which expresses some inherent trait of character, as little short of criminal. With the heedlessly manipulated wheel and the bunglingly restored crown goes the expressive character of the teeth; but with the skillfully manipulated wheel and the scientifically restored crown is returned that character of which these teeth are the exponents.

In view of distinctively segregating this aspect of character-reading and giving it prescribed boundaries, I would suggest that it be represented (until a better is supplied) by the term maxo-dentognomy, which may be defined as the science of reading a person's tastes, proclivities, disposition, and intelligence by the relative shape and positions of the maxillæ, the form and peculiarities

of the dental arch, the dome or roof of the mouth, and the teeth as regards their position in relation to each other, their size, length, breadth, color, peculiarities, etc. In short, maxo-dentognomy includes the maxillæ, the teeth which they support, and the oral cavity in general.

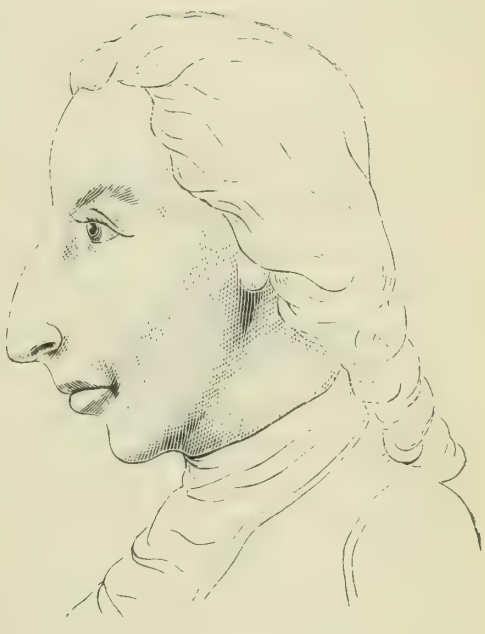
That the general form and peculiarities of the maxillæ are remarkably expressive of character is an established fact. Cases are common in which these bones display forms and characteristics not in keeping with the teeth which they support. Both are subject to abnormal construction, yet it is, however, uncommon to meet with subjects whose maxillæ are both thus affected, the greater number of variations appearing in the lower.

Illustrative of the foregoing statement, I wish to present profile outlines of opposite extremes,—the first portraying the features of

FIG. 1.



FIG. 2.



that irascible French writer, Voltaire; the second, those of Charles II, King of Spain. In the former case we find a markedly prognathic development of the lower maxilla. That alone largely indicates the nature of the man, and together with the general form of the bone discloses proclivities which he is known to have possessed, having been malicious, of sarcastic and satirical mind, envious and egotistic as well as atheistic. These are defects which hid his finer qualities, and had we been able to have studied his nature in a maxo-dentognomical aspect, there is little doubt that these and many other attributes might have been accounted for. That he was possessed of good qualities there is no doubt, one indicated by this peculiarity being generosity, and had it not been for the overpowering influence of baser propensities he would have been generous to a fault. Although somewhat parsimonious, history tells us he exhibited some degree of generosity toward those who served him, which spirit no doubt was actuated by selfish motives.

With Charles II we find a reverse condition. Although well defined, the lower maxilla is short and constricted, resulting in an

orthognathic state. The vast diversity in character is readily seen, and it does not necessitate great demands upon the imaginative powers to realize that had Voltaire possessed the lower maxilla of King Charles, he would have lacked those attributes which made him the most shrewd, indomitable, libelous social philosopher and poet of his time. And by supplying King Charles with the lower maxilla of Voltaire, he would not have been the inconsequential monarch which he proved to be, continually requiring a stronger mind to lead him, utterly lacking force of character and executive power which he would otherwise have possessed.

Thus are shown the intimate relations which these two bones entering into the substructure of the face bear to maxo-dentognomy and physiognomy. Over them is placed a superstructure of soft tissues which help to form the most expressive features of the countenance. Hence the relative positions, peculiarities, and abnormalities of these bones find ready expression in the face. Their influence may be seen upon the nose, the eyes, in fact upon every feature of the countenance. The shape of the nose, the expression of the eyes, the presence or absence of lines upon the forehead or face, cannot affect the form or position of the maxillary bones, yet we are continually meeting cases in which the reverse is true, faces whose entire expression has been influenced in general and in detail by these all-important bones which form the groundwork of the most indicative portion of the face; hence we find maxo-dentognomy forms a part of the foundation for physiognomy.

The lines separating these two sciences are distinctive, that of the former ending with the consideration of the dento-maxillary structures, while the latter deals entirely with the soft tissues, which are largely dependent for their form and indicative attributes upon the different ossific tissues forming the basis of maxo-dentognomy; yet the blending of the one with the other is so perfect and harmonious as to theoretically destroy all dividing lines.

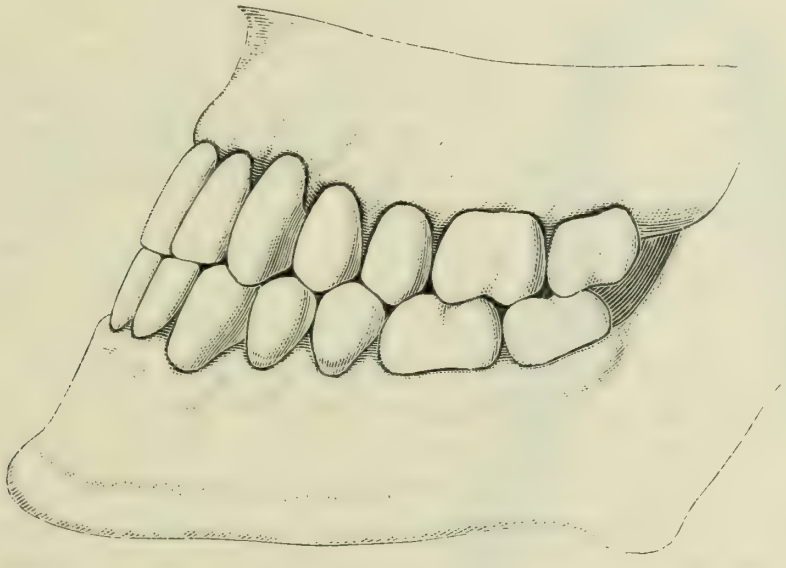
We will not on this occasion enter into the treatment of the subject from its ethnological aspect, which of itself presents a broad field for research and study, but rather endeavor to give it tangible outlines and also present examples which to me furnish proof positive of the theories herein advanced. I will call your attention to another characteristic form of the maxillæ which represents the faculty of wit.

The general shape approaches that which is often vulgarly described as "lantern-jawed." History will bear me out in the statement that the majority of our noted wits—those who by nature were spontaneously witty—possessed long, narrow, and laterally depressed maxillæ. Abraham Lincoln was typical of this class, and "Mark Twain" and the late "Bill Nye" may also be cited as manifesting this feature in some degree. There are many persons who display faculties controlled by tact that may pass for wit, but which in reality is mere acting or reproduction of another's witticisms, and who do not show the condition just described.

Those possessing jaws of this general class, together with cer-

tain characteristics of the teeth which indicate a predominance of the carnivorous type and of which I will speak later, are found to be more or less immoral and irreligious, many of our agnostics and atheists displaying these features. Just why this is true is rather difficult of explanation, unless, perhaps, that this laterally constricted condition of the jaws is also indicative of rather low digestive powers; hence we find dyspepsia a malady common to these subjects, and pray tell me who on earth is less at peace with his God and fellow-man than is the chronic dyspeptic? The degree of mentality possessed by an individual may be determined by the relative state of prognathicity of the maxillary bones, either together or alone. The more pronounced the prognathic manifestation of either jaw, the less intellect does the person possess. When the condition is shown by the lower maxilla the possessor is inclined toward generosity; when shown by the upper a penurious disposition is the accompaniment.

FIG. 3.



Those showing an orthognathic state of the lower maxilla are somewhat lacking in mental power, have a narrow, contracted mind, lack determination and strength of character, are not famous as projectors of great enterprises, are conceited, and often bigoted.

A lower maxilla represented by this chart (Fig. 3) shows the possessor to be cruel, unfeeling, unsympathetic, and often vicious. They derive fiendish delight from inflicting torture, taking for their victims the unprotected and those incapable of resistance. Dumb animals are seldom treated with kindness, but are more frequently the unfortunate recipients of their inhuman cruelty and passion. They are remarkably selfish, and incapable of strong affection; are not fond of children nor of pets.

The lines extending from the incisive edge of lower centrals to the mental prominence show scarcely no depression just above the latter, as is usually the case. Another feature of this type is that, although the lower maxilla approaches a degree of prognathicity, there exists a fairly normal over-bite. In order that this may be accomplished, the upper anterior teeth project outward at

the incisive edges, while the lower ones take a reverse direction. Captain-General Weyler of the Spanish forces in Cuba possesses a lower maxilla typical of this class, and his reputation bears out the truth of this statement. A lower maxilla which occupies a normal position in relation to the upper, but in which the mental prominence is strongly marked, is indicative of kindness, sympathy, and great love of children.

I will not take up the consideration of the alveolar arch and dome of the mouth as pertaining to this subject, but will pass on to the teeth which are next in order and upon which maxo-dentognomy is founded. That the teeth furnish reliable data in the study of character there can be no doubt, and so far as the possibilities of the science may extend, they must at all times and under all circumstances be more reliable than the signs of either phrenology or physiognomy; for though the nose may change its contour or lose its color, the lips become bloodless, cracked, and shriveled, and the face generally change its characteristic features in a decade, yet the teeth, so long as they remain, suffer no change in outline except through the ravages of dental caries or mechanical interference. If the teeth are placed in close proximity it denotes quick perception and intelligence. They should however be regularly set, for evenly placed teeth denote a better balanced disposition and better developed mind than teeth that are crowded and overlap each other.

If the teeth project outward, it is because their owner has a stupid disposition and is a person on whom education, or at least instruction in the arts and sciences, is lost labor. Inquisitiveness is also a characteristic which accompanies this feature.

Should the teeth advance forward upon the lip, the person, despite his faults, has a certain degree of generosity and kindness in his make-up. If on the other hand they turn inward, even ever so little, it denotes a penurious disposition and unstable character, and one not to be trusted. There is also liable to be a degree of feebleness of digestion where the inward curve is excessive and the maxillæ are somewhat constricted laterally. Those that are vertical or have but a slightly outward slant, represent the most even-tempered and thoughtful persons. (Fig. 4.) The teeth of the upper and lower jaws meet almost exactly, there being little overbite, and the cusps are not prominent. Often these cases present different degrees of mechanical abrasion, largely dependent upon the age of the person.

Those whose upper and lower teeth project greatly, the one beyond the other, are of a lower order of intellect and are less emotional than others. Negroes and other races of inferior development show their teeth to a great extent in conversation; hence it is laid down as a general principle that the more the teeth and gums are displayed the less profound is the mind. There are many fairly well endowed subjects who upon opening the mouth expose a certain part of the gums, both upper and lower, but a genius or person of surpassing talent is never found to exhibit this peculiarity.

In the teeth of man are combined characteristics of different types of the Mammalia, two of which represent the Granivora and the Carnivora. Should one person show teeth which incline in shape and general character more toward the carnivorous than they do toward the other types, then it is apparent that the possessor has stronger inclinations toward that particular type. The carnivora we know are flesh consumers, and all flesh-eating animals possess greater or less degrees of ferocity, are treacherous, alert, sly, and cunning. Their predatory mode of existence calls for the possession of these attributes together with some others, which may be shown, or they may be modified by the other types.

Predominance of the carnivorous type as indicated in the teeth shows strong pointed and recurved cuspids, molars laterally compressed (particularly the first), cusps prominent, coronal surfaces markedly trenchant. Persons exhibiting these features are

Fig. 4.

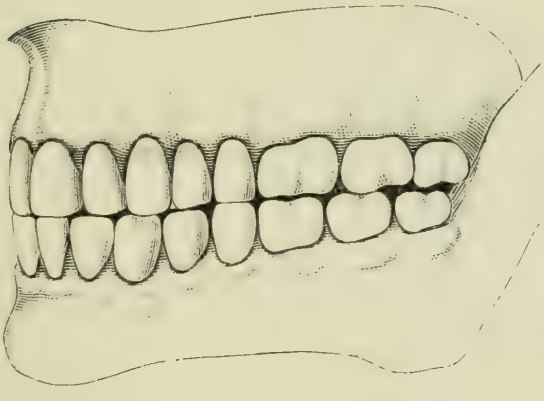


Fig. 5.

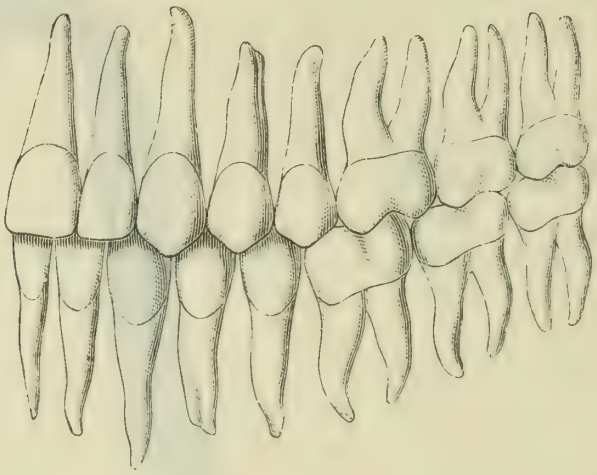


possessed of shrewdness and cunning, alert, sly, and sometimes treacherous, are quick-tempered, and when aroused to anger invariably use the first weapon at hand to resent a real or imagined injury, and will not use fistic force unless compelled to do so. If in connection with this type we find the maxillæ constricted laterally, giving the condition to which we have inelegantly referred as "lantern-jawed," and which almost invariably is an accompaniment, it will be found that such persons have a very sharp and abusive tongue, and are ever ready for a wordy battle, seldom being vanquished. Being possessed also of cutting, sarcastic wit, they are much more formidable enemies in an oral than in a fistic conflict. In following this type still further, especially those cases in which the laterally constricted condition is strongly marked, and in which the jaws take on this general form (Fig. 5), with the sharp, pointed cuspids still persisting, they are found to possess a disagreeable disposition and somewhat depraved nature. When

actually depraved, they employ the most vicious profanity, and vulgarity is a feature of their ordinary conversation.

The brutish type is entirely distinct from the foregoing, and is found in cases where the carnivorous is less pronounced. Although the bicuspids and molars are fairly trenchant, the cusps are less marked, but more rounded or square, all surfaces of the teeth showing generally rounded contour. The lines are heavy, the teeth thick and short and often unevenly set. The molars are short and square, and alveolus thick and heavy. Teeth conforming to these rules show the possessor to have brutish tendencies, which are asserted in an entirely different manner from those who possess a ferocious nature; they are slower to anger, but savagely brutal in its display, less acute of intellect, and slower of movement. They express displeasure and anger in a brutal manner, by brutal force,—the reverse of that described in the foregoing case. This is the class of men who when under alcoholic influence relieve

Fig. 6.



themselves by damaging and destroying property generally; are famous as "wife beaters," and in the great majority of cases those who commit assault and rape will show teeth representing this type. A prominent characteristic is stubbornness, but they seldom reach the degree in the upward scale of development, nor to the depth of depravity to which those showing a predominance of the carnivorous characteristics may obtain.

Fig. 6 shows teeth regularly set, firm occlusion and normal overbite. Such teeth are usually well covered by the lips, are of good size, long, and the surfaces abounding in curves. No sharp angles are tolerated, and the festoons are nicely arched. The characteristics presented are, as is readily seen, invariably good. The tendencies of the possessor are pronounced, of liberal views, strong passions, strong and heroic virtues. All the great men of history have possessed teeth of this class. Celebrated criminals and divines, financial speculators, originators and promulgators of great schemes, men like Socrates and Napoleon had such teeth, and our great men of to-day also are thus favored. Such teeth represent the highest type of intellectual development thus far attained by the human family. There being a marked predominance of the

carnivorous type in this case, it necessarily follows that this condition must be accompanied by the strongest characteristics and best developed minds.

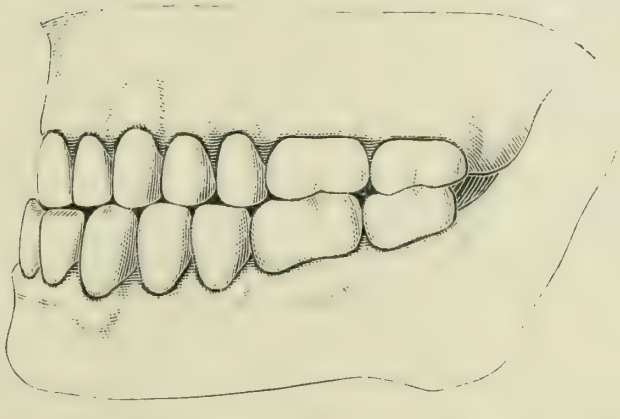
Teeth representing these attributes must possess the proportions herein laid down, for although all other features may be present, yet if the incisors are narrow and the approximal surfaces straight and devoid of those rolling lines, the subject has a poor constitution, inclined to be weak, and might be termed granivorous, for their diet consists mainly of fruit and grain with but little meat.

The characteristic feature strongly represented by Fig. 7 is that of penuriousness. It is shown by marked protrusion of the incisor teeth, particularly the centrals, at the incisive edge, there

FIG. 7.



FIG. 8.



being of necessity no irregularity aside from the condition. When the mouth is in repose, the upper lip does not entirely cover the incisors, and it is with difficulty that it may be done. Business transactions with subjects exhibiting this condition will prove unsatisfactory, and they are pretty sure to get the advantage in one way or the other.

Generosity is indicated by the under bite of the upper teeth. (Fig. 8.) There is a greater or less degree of prognathicity of the lower maxilla, and mechanical abrasion is usually manifest. If the protrusion of the lower jaw is great, it portends an inferior intellect, and often fools show this condition. However, in the case illustrated we would not look for profound mentality nor shrewdness in business matters; in fact, owing to a generous and sympathetic nature, he makes a ready mark for the machinations of the scheming and unscrupulous.

Short and broad teeth, short cusps showing mechanical abrasion, square occlusion, arch and dome semi-circular, indicate a predominance of the granivorous type. They are even-tempered, good-natured, somewhat aspiring, but seldom undertake great schemes nor possess much creative ability; they are generous and whole-souled, but are not numbered among great financial speculators, although being possessed of good judgment, make good, staid citizens and business men. They are not imaginative or possessed of idealism, neither great profundity of intellect. Teeth that are broad and short are indicative of strong vital powers and a taste for carnivorous foods. Those showing a reverse form indicate physical degeneracy and a preference for granivorous diet. I trust a sufficient number of cases have been cited to demonstrate the theories herein advanced, and by careful study and application of the combinations so essential in the determination of character by physical signs, maxo-dentognomy may in time be recognized as a separate science.

In conclusion, I desire to call your attention to just another thought. Supposing for convenience' sake we set aside the theory that we are subjects of Divine providence and creation, and cast about for proof of our existence through the doctrine of evolution. Of all component parts of the human organization, do not the teeth furnish proofs most positive? How else, other than through God's creation of man, are we able to account for that intermingling and blending of the principal characteristic features of the teeth of lower animals in those of man but through a long series of developmental changes and differentiation? Granting that the Creator fashioned the human teeth in one certain form, as must have been the case, having created but one being of either sex, would not that particular form still persist instead of exhibiting different outlines and characteristic features in each human being as we find them to-day? These statements are but hypothetical, for not being a follower of the Darwinian schools, neither of Huxley nor Tyndall, I am incapable of defending the position.

But perhaps if maxo-dentognomy as herein propounded should develop into a special science, theories relative to man's existence, which heretofore have been but theories, may become accepted truths.

Therefore I plead that this "new departure" may receive intelligent consideration from the members of our progressive profession, and its future existence as a special department in the study of character be permanently established.

Discussion.

Dr. Frank French, Rochester, said that there existed a universal practical belief in physiognomy, that every one felt instinctively that the character and the abilities of a person were indicated by the form and expression of the head and face, but the science of physiognomy, if it can be called a science while it is so imperfectly known, has failed to be developed, though so universally recognized.

We all know at sight the typical idiot's head and the under jaw of the persistent man, and many other indications are easily classified; but the general knowledge of the subject is very hazy, and the essayist deserves the thanks of the society for bringing before us this paper, which shows that much thought and earnest study have been given to the subject.

Dr. R. H. Hofheinz, Rochester, said that it would be an assumption to undertake to criticise such a paper unless one had the time and enthusiasm to give to the subject which it had received from the essayist. He was grateful to Dr. Beach for preparing the paper, and while he agreed with him in the main differed with him in the emphasis put upon certain details. We can all easily agree in praising the paper for its originality, which is a rare feature in papers read before dental society meetings.

The science of physiognomy is not new. We read that in the time of George II, in England, by an act of Parliament all persons pretending to have skill in physiognomy were deemed rogues and vagabonds, and were liable to be publicly whipped or sent to the house of correction. Homer was a close observer of appearance as correlated with character. Hippocrates refers to the subject, but believes more in the influence of environment in determining disposition. Aristotle gave the first systematic treatise on the subject. The only name of importance of those who wrote on the subject during the eighteenth century was that of the great Swiss, Lavater, and his popular success was largely due to the pious spirit which pervaded his writings. He knew of no writer who has given the formation of the maxillæ and the teeth more than ordinary prominence in correlation of character, except the interesting paper just read.

He gladly approved what Dr. Beach said about the heedless use of the grinding wheel and the bunglingly restored crowns. Be the teeth an expression of character or not, it is the duty of the operator to preserve their individualism, providing he cannot esthetically improve upon them.

In juxtaposition to the picture of Voltaire, the homely, with his strongly developed prognathism, which may in his case have developed largely after the loss of his teeth,—we have no portrait of him in his youth,—he would like to mention the German poet, Heine, who had many characteristics in common with his French *confrère*. He was malicious to a degree, fully as sarcastic and satirical as Voltaire, not quite as envious and egotistic, but fully as much of an atheist, yet his portraits show one of the most beautiful faces and most normally developed maxillæ we know of. The writer says that atheists have laterally constricted jaws, a condition indicative of low digestive powers; but look at Ingersoll: what grandly developed masticating apparatus he has, and yet he is the greatest specimen of the American atheist.

We will not readily agree with the essayist that people who possess teeth which project outward invariably have a stupid disposition. The anatomical appearance certainly inclines that way, but as many fools can be found with perfectly articulating teeth as can

be found with this irregularity. In truth, some of the patients who come to us to have this irregularity corrected are among the most intellectual of all for whom we do work. We should discriminate between prognathism of the jaws and of the teeth. The latter is usually owing to faulty dentistry, temporary teeth remaining in the upper jaw too long after the permanent ones have developed back of them. Of course such prognathism could not be an indication of character. Prognathism of the lower maxilla, however, is often found among the inferior races, and would naturally show their lower characteristics.

The philosophy of physiognomy has certain foundations. The actions we look upon as expressions of emotion are produced by certain muscles which by habitual use become strengthened, and when the skin diminishes in firmness and elasticity with age the action of the muscles produces furrows and wrinkles in the skin at right angles to the course of the fibers of the muscles, as in the case of Voltaire. It is certainly very possible that habitual muscular action, through perhaps several generations, may alter the contour of such bones and cartilages as are thereby acted upon by the muscles of expression, and if maxo-dentognomy shall in the future be looked upon as a specific science the credit must be given to Dr. Beach, who has been the first to call attention to it.

Dr. J. H. Beebee, Rochester, expressed his disbelief in the theory of evolution. He thought it was like a chain consisting of nothing but broken links. No one lost link would make it a continuous chain; a new link between each of the existing links would be necessary. No evolutionist can show where one species developed into another. The horse was always a horse. It has changed in size and form, but it was always a horse and is such still. It seemed that the theory of special creation of types offered less difficulty than the theory of evolution. He spoke of a skull that was found in Calaveras county, California, which was seventy-five feet below a glacial moraine, and thirty-five feet under the lava from an extinct volcano. Its position thus proved its great antiquity, and yet the characteristics of the skull indicated as high an intellectual power as any found perhaps in this audience.

Dr. Chas. T. Howard, Rochester, thought that many of the variations in the jaws and teeth were brought about by the artificial character of civilized life. In savage tribes such abnormalities are not seen. The environment of civilized life and the artificial habits affect the whole personality. Our character is the result of education and environment.

Dr. Beach, in closing the discussion, thanked the society for the kind consideration they had given to the paper. He did not claim to know that the theories he advanced were true, but had presented them as the issue of his thought. So many things have to be considered that one man could scarcely expect to formulate and prove the rules for judging character from these bones; but the evidence having been presented, he would leave the subject with his hearers.

The subject was passed, and the meeting adjourned.

UNION MEETING OF THE MARYLAND STATE DENTAL ASSOCIATION, WASHINGTON CITY DENTAL SOCIETY, AND VIRGINIA STATE DENTAL ASSOCIATION.

(Continued from page 671.)

SECOND DAY—*Evening Session.*

THE convention was called to order at 8 P.M., Dr. D. E. Wiber in the chair.

Dr. T. H. PARRAMORE, of Hampton, Va., read the following paper:

PYORRHEA ALVEOLARIS.

I shall confine myself entirely in what I shall say of pyorrhea alveolaris to a statement of the impression concerning this disease made upon my mind by a more or less close study of it for about twenty years. I shall also state as briefly as possible my methods of treatment.

First, with regard to the persons most liable to attacks of this disease. My first impressions were that it was confined to persons predisposed to gout (gouty diathesis), or to those in whom gout had already developed. A more extended observation of the disease has convinced me that while persons predisposed to gout are more apt to be afflicted with pyorrhea, it is by no means confined to such persons, nor is it always found in the mouths of patients suffering with gout, chronic or acute.

Second, that the germs of alveolar pyorrhea may be transferred from one mouth to another, flourish, propagate, and produce in their new environment this disease, will scarcely admit of reasonable doubt. I am often asked in these days of antiseptics why was it that dentists in the past, when little was known of microbes and disease-germs, did not often, by imperfectly cleansed instruments, inoculate one patient with the disease of another? This is my answer to this question: Nearly every remedy used by a dentist is a germicide, and years ago we were killing millions of microbes without being aware of the excellent work we were doing. While this statement is true, still I fear we often failed in our work of destroying the enemy who got a foothold in our camp, and is to-day manifesting his presence in pyorrhea and other diseases; in view of this fact I would say sterilize, sterilize, sterilize. I am convinced I have seen rare instances in which a wife has contracted this disease from her husband, and *vice versa;* an evidence of its infectious character and an argument against its dependence upon a gouty diathesis for development.

I feel that anything I might say upon the subject of diagnosis would be a work of supererogation. This disease has been so often clearly described that no intelligent dentist will mistake it.

With regard to constitutional treatment, I cannot do better than quote from Dr. Gramm (*Items of Interest*, vol. xix, p. 163): "Every case of pyorrhea alveolaris associated with a constitution from which the marasmic fog has not yet been lifted, calls for in-

ternal medication for institution of hygienic measures; demands that trinity of restoratives, nutriment, assimilation, and elimination." In other words, the treatment should be directed toward the restoration of the vital organs to perfect health and normal action.

The local or surgical treatment of pyorrhea is that in which the dentist is most deeply interested, and is that of which I wish to speak. The removal of calcareous deposits upon the roots of these teeth and the necrosed portions of the alveolus is an exceedingly difficult and delicate operation, but it is absolutely essential that this part of the treatment be very thorough if one hopes for ultimate success. While properly shaped instruments cannot supply the place of skill in the operator, they render this part of the treatment much less difficult. It requires time and practice to acquire that educated touch which conveys to the hand of the operator knowledge of the presence of a foreign substance upon a root or of necrosed bone; but when that touch is once acquired I believe that, except in extremely difficult cases, with proper instruments all such foreign matter may be removed.

The imperfections and want of adaptability of many appliances offered to the purposes for which they are intended influenced me to design a set of instruments, part of which set (made for me by The S. S. White Manufacturing Company from patterns which I furnished) I will pass around that you may examine them. The distinguishing feature of these instruments is the crescent-shaped edge that clings to the convexity of the root, making it possible to follow a root well up to its apex without the annoyance and difficulty attending the attempt to accomplish this with a perfectly straight or convex edge. These instruments should be made of different sizes, the larger ones for larger roots, and the smaller ones for the upper part near the apex of large roots and for small roots. That the blade should stand at different angles to the shank, so as to reach every part of any root, will suggest itself. Some of these instruments are made to cut with a pull, and others with a push; they should be made in pairs, a pull and a push of each shape.

I follow immediately the operation of removal of deposit with a local application of chemically pure sulfuric acid, carrying it up under the gum to the apex of the root if possible, and follow the acid treatment almost immediately with an application upon cotton of a saturated solution of bicarbonate of soda, continuing the use of the soda until all effervescence or ebullition ceases, and prescribe listerine, borolyptol, or a saturated solution of boracic acid to be used several times a day as a mouth-wash.

In most cases I find it necessary only to follow this treatment with three per cent. hydrogen dioxid (H_2O_2) under the margin of the gum until every indication of disease has disappeared.

Do not make the mistake of undertaking to treat too many teeth at one sitting; two or three at a sitting are as many as one should attempt.

Permit me, in closing, to renounce all claim to superiority of

method or of dexterity in operating. I feel that the amount of success attending this treatment in my hands warrants me in bringing it to the profession. I give it, trusting it may pour a drop into that mighty river of scientific research which is rushing on, gathering truth and eliminating error as it goes.

Discussion.

Dr. Williams Donnally, Washington, D. C., said that one reason the dentists of the past did not scatter this disease from one of their patients to the others was because they did not treat the disease, and consequently did not thrust their instruments down into the infectious material. He thought full strength acid too strong; if it were only ten to twenty per cent. acid it would be much safer. He uses trichloracetic acid now, and finds that it softens the deposit; he applies it three or four times, letting a day or two intervene between the applications. It is important to completely remove the deposit and finish the surgical part of the treatment at one sitting. He also uses hot water to wash out the cavity, hot as the patient will bear it, throwing it well into the pocket and around the gum, and following with tincture of iodin.

Dr. H. B. Noble, Washington, D. C., would use much smaller instruments than those shown, the better to reach the most important part at and near the end of the root. He should want a very fine sickle-shaped instrument with three cutting edges, to be used with both the push and pull movement. The instruments designed by Dr. Riggs were too large for the necessary thorough removal of the deposits. It is very important to thoroughly wash out the pockets, and well not to use a large syringe, rather the hypodermic. He uses also iodin to wash out the pockets, for its healing quality.

Dr. J. V. Hailer, Wytheville, Va., thought it a mistake to use the pure sulfuric acid, because it unites with the calcic deposit and forms a substance,—calcium sulfate,—which is not soluble in the acid; while on the other hand a dilute sulfuric acid will dissolve the deposit entirely.

Dr. Parramore replied that he had adopted pure sulfuric acid after using the dilute acid. Years ago we depended upon aromatic sulfuric acid, but the pure acid answered the purpose better. He used it not to dissolve the deposit, but to wash out the pocket and for its action upon the gums. The ebullition which takes place with it in connection with the bicarbonate of soda clears out the cavity. In regard to the instruments, the smaller ones he had not brought with him, but those not here were smaller than those shown. Their peculiarity is in their crescent-shaped cutting edge. The medicines commonly used he thought were useful, but he thought that thoroughly clearing away all deposit, with proper hygienic measures, would effect a cure without other local medication. He preferred to consult a physician about the general health, which was very important.

The subject was closed, and Dr. Jas. K. Burgess, Richmond,

Va., read a paper on "Prosthetic Dentistry," of which an abstract follows:

While advancing the idea that there is no branch of dentistry more important than that which seeks to properly restore by artificial means the lost organs of mastication, Dr. Burgess regretted that there was no branch more lightly regarded or more slightingly treated. The conditions which make prosthetic dentistry a necessity are among the most serious presented for treatment. Each particular case has its own artistic and mechanical requirements, which must be met apart from any other case. Patients who present themselves to us for treatment intrust much to our keeping,—health, comfort, and personal appearance often depending largely upon our success or failure in the performance of our duty. He who recognizes these facts and spares no pains to provide his patient with a comfortable appliance, constructed upon such mechanical principles that it shall retain its position as firmly as possible, occlude properly, restore as far as can be the natural contour and expression of the face and harmonize with the other features and the complexion, must be both mechanic and artist in his line. He who fails in these things falls short of his duty and receives his reward unjustly.

As prosthetic dentistry is a broad subject, of which no one subdivision can be treated at length in a single paper, Dr. Burgess confined himself to the familiar field of rubber work, speaking especially of some points in which he had noticed much carelessness.

In the preparation of the mouth to receive an artificial denture, where special preparation is indicated, many circumstances have a bearing which are not always under our perfect control, so that it is scarcely possible to make any rule that will apply to all cases, except that of removing tartar and thoroughly cleaning any teeth that are to remain, extracting useless roots where circumstances will admit of it, etc.

The impression, it need scarcely be said, is the very foundation stone of an artificial denture, and it is almost as hopeless a task trying to construct a proper one from a poor impression as that of building a substantial structure upon a sandy foundation. Impression materials are so many, with such a variety of properties; trays are of such an assortment of sizes and shapes and admit of alteration so readily, and new ones are so easily improvised, that failure to secure a good impression is really inexcusable. One thing of special importance, and often neglected, is that in full cases the impression shall run well back and copy accurately the tuberosities and intervening parts of the upper jaw, and the undercuts which are found at the corresponding part of the lower, much depending upon these points.

Whoever weds himself to the use of any one impression material to the exclusion of all others, as many in fact do, confines himself within too narrow limits, and deprives himself of many advantages which each contains that are not found in any other. Often a combination of two of them for a single impres-

sion gives beautiful results, as, for instance, taking it first in modelling composition or wax, trimming away the surplus, and using this as an accurately fitting cup in which to take a plaster impression.

Making the model after the impression is secured is a plain mechanical proposition, but the writer had found nothing that worked quite so satisfactorily in his hands as separating fluids for plaster impressions, as shellac and sandarac varnishes, each used in thin solution, painting first with shellac, which stains deep into the model and acts as a guide when we come to separate; then, allowing a few moments for this to dry, giving it a coat of the sandarac, which facilitates separating. This also is allowed to dry thoroughly before pouring, and gives a smooth and polished surface to the model.

Next comes the preparation for and taking of the bite, which ranks in importance alongside of a good impression, and which seems to be in some cases the least understood and in many cases the most carelessly dealt with and worst abused step in the whole operation. When properly done, it means far more than getting the imprints of the occluding teeth in a piece of soft wax. The method often used of placing a roll of soft wax over the bare gums and letting the patient bite into it is a bungling, careless, inaccurate one that should have no place in modern dentistry. The proper appliance for taking a bite consists of a base-plate shaped over the model, and made of some stiff material, such as modelling composition or special material prepared for the purpose, or of paraffin or wax, stiffened, when made necessary by a soft ridge, with wire or a strip of metal (German silver being excellent for the purpose), and having upon the ridge a rim of wax for the occluding teeth to rest upon and built up in front to the approximate fullness which it is desired the completed denture shall show. Taking a correct bite with such an appliance brings in the work of both the artist and the mechanic. It means the trimming away or building up of the wax rim until the proper width of bite is secured, and the lips, as well as the jaws, are found to maintain their proper relation to each other when the rim and occluding teeth, or two rims, in case of both upper and lower, are brought firmly together. Care should be taken that they touch simultaneously at all points, else one or both may be tilted and an incorrect bite result. It means adding a little to the fullness here or removing a little there if need be, to secure the proper facial expression, and avoid either extreme of having our patient appear toothless or as if carrying the tongue under the lip. It means noting the length of the lip and the angles of the occluding teeth, if there be any, and marking the median line if it is not already plainly shown on the model. These are all guides which we need if we would perform our work intelligently. Last of all comes getting the imprint of the occluding teeth or fastening the plates together, which, while very important, is simple enough when the other part has been correctly done.

The bite being secured to an accurate working articulator, the

selection of the teeth becomes now the proposition. Our lamented Professor Winder used to say that no sensible man would think of putting short, broad, dark teeth in the mouth of a tall, slender blonde; nor long, narrow, white teeth in the mouth of a short, stout brunette, and that between these two extremes every man must judge for himself. This is about as definite a rule as can be laid down. We learn by observation and experience how to harmonize shades with complexions, but complexions are so varied and shades so many that experience must be every man's teacher in this regard.

As for the choice between block and plain teeth, he much prefers the plain for many reasons. Block teeth are awkward and clumsy, —parts of nearly all sets, and often the entire set, are undersized, and as a whole they are artificial looking, incapable of the nice adjustment and freedom of arrangement of plain teeth, and are not as substantial. If the fact that the pink rubber or other gum used with plain teeth is slightly off from the natural color be urged as an objection to their use, then it may be said that the ever-present seam between the blocks, however carefully made, is equally objectionable; and at such close range, and where the lip is raised so high that the difference in color of the gum is noticeable, the seam is equally noticeable. The fact is that the gum, unless poorly shaped or polished,—for which there is no excuse,— is the least noticed of all, especially when the teeth appear natural in shade, size, shape, and arrangement.

The teeth being selected and arranged, they should be fastened securely to the base-plate with a hard, sticky wax, preparatory to trying in the mouth, when such changes as may be found necessary to perfect the occlusion, improve the expression, and naturalize the arrangement should be made. A wax made with seven parts of white wax and three parts of gum dammar, melted together, and one part of rosin added, will be found far superior for many purposes to the ordinary yellow wax.

Whatever special preparation of the model is necessary should be made now, before the plates are finally replaced and secured.

Dr. Burgess does not like the so-called vacuum cavities; can see no advantage to be derived from their use, and consequently does not use them, his objections being based upon the inflamed and spongy condition often seen in mouths which seem to have been made almost a wreck of by their use. The idea that they can be of any material aid in establishing suction, in the size and shape in which they are very often used, he does not believe has any foundation in fact, and it seems absurd. The large, deep ones so frequently met with accomplish their good results not by creating any considerable amount of suction directly themselves, but by the relief which they afford the hard prominent part of the palate from pressure, allowing the plate to bear more firmly upon the soft parts. That this is so is shown by the fact that the mucous membrane often takes the form of these cavities, leaving no space unfilled, and yet the suction remains unimpaired. The bad effects, however, so offset their good results as to make their use, in view

of a better method, unjustifiable, certainly in a great majority of cases.

What is necessary is not a large space between some part of the plate and the palate, but that nicety of adjustment which brings the entire surfaces of the two firmly in contact with each other at the same time. This is accomplished either by scraping the *impression* where this hard part occurs, or perhaps better still by overlaying the corresponding part on the model with from one to three thicknesses of No. 60 tin foil,—*not as a vacuum cavity*,—with the additional advantage of being more uniform and accurate. At the same time it allows the plate to run well back, and by cutting a properly shaped groove in the model causes the edge running from heel to heel to be turned up in such a way as to press firmly against the soft parts. Judging from plates seen, this latter is a much neglected point, and it is really one of the very best aids, and in many cases necessary for perfect suction. These points being properly attended, and the outer rim correctly shaped to allow for free play of the muscles, there should rarely be any trouble about suction.

One very common fault with lower plates, too, is that they do not run far enough back nor take proper advantage of the undercuts which are found there, this being of great importance in steadying and holding the plate in position.

A few minor, yet important, points may be mentioned briefly for the benefit especially of some younger member of the profession. The first is having red rubber show through the pink. Perhaps the best remedy for this is what is known as the Boyd system of flasking, but if the ordinary method is used care should be taken that the first half of the investment comes just to the edge of the wax plate, and that waste gates are never cut in front of pink rubber. If these points are observed and the case properly packed, the trouble may easily be avoided.

Polishing between plain teeth is a tedious and worrying task to many young dentists. In the first place, the wax should be carved out cleanly and smoothly around the teeth, and the gum shaped before investing exactly as it is desired it shall be when completed. Then, in investing, care should be taken to fill well the interdental spaces so that no air-bubbles may remain to be filled with pink rubber. When the plate is vulcanized the outside surface may be skinned off with a chisel, and with a thin, stiff brush-wheel on the lathe, and the constant application of wet pumice, holding the points of the teeth toward one's self always, these spaces may be brushed smooth and polished in a very few moments. Another good idea is the application of liquid silex to the model just before packing, which prevents the rubber coming in contact with the raw plaster, and gives a smooth and polished palatal surface to the plate.

In conclusion, he said, what one needs is to become thoroughly acquainted with the materials and appliances to be used in this or in any line of work; to know the changes of properties which occur under varying conditions, and to learn by experiment and

study which will best serve any given purpose; and, above all things, watch and take care of the small points, for, after all, it is the small points that count; the twisting or flaring of a tooth in or out, lengthening or shortening it slightly when trying in on wax, that gives a more natural arrangement; the building up or trimming away a little of the fullness, that gives a more pleasing expression; a little extra trouble in grinding, that gives a more perfect occlusion or a better shape, perhaps, to an anterior tooth; the little extra pains in waxing up, that facilitates so much the work of polishing; a little extra trouble in thoroughly roughing and smoothing all edges, that saves our patient much pain and annoyance. In fact, the sum total of the whole thing is made up of small points, and the successful man is he who recognizes this and completes each step thoroughly as he proceeds, considering nothing too insignificant to claim his attention, nor anything too difficult to be accomplished.

Discussion.

Dr. C. L. Steel, Richmond, had been paying more attention to prosthetic dentistry recently than ever before, and the study of this branch of work had made him a more thoughtful operative dentist. The study of prosthetic dentistry taught him to place more value upon the natural teeth.

The ground-work of professional dentistry is where the professional differs from the mere mechanic. The professional man should be thoughtful and artistic, should understand the difference in faces and temperaments found in different patients, and should consider carefully what teeth may with advantage be left in the mouth. In making an artificial denture it is of importance to have stability in the trial plate. He had used what are called "true" bite plates and found them very satisfactory, and would advise all to use them.

Dr. H. C. Thompson, Washington, D. C., said he was not a prosthetic dentist to a very great extent, but that he had evolved the fact that too much care could not be taken in the details of preparation of the mouth and taking the impression. He finds it a good plan after the impression is taken to make a diagram of the mouth, and marking on the diagram the character of the surface as proved by feeling. He divides the diagram into four spaces and again subdivides these, and marks with a pencil in each division the character of the corresponding surface of the mouth. This definite plan is much better than guessing, because of the liability of guessing wrong, while with the diagram carefully made you cannot go wrong.

Dr. G. Marshall Smith, Baltimore, spoke of the Jackson method for clasping on plates, especially lowers, having the clasp over the first or second bicuspid. This plan gives good success in difficult cases.

(To be continued.)

American Medical Association—Section on Dental and Oral Surgery.

(Continued from page 665.)

Second Day—*Morning Session* (Continued).

Discussion on the subjects treated of in the papers of Drs. Curtis, Latham, and Knight was taken up, and Dr. Geo. F. Eames, of Boston, said there were two points in regard to the subject of the last paper which should be made plain. The first was that such growths in the antrum are less malignant generally than sarcomas usually are when occurring elsewhere. He had had some cases which illustrate this. One case in particular was of a round-cell sarcoma, which he thinks began in the nose and extended into the antrum. He removed the polypi with a snare; microscopic examination of the tissue showed it to be a sarcoma. He expected the growth to increase rapidly, but for two years there has been no recurrence. The other point of which he would speak was the necessity of careful general treatment after the operation. This patient had been put on careful tonic treatment and protonuclein tablets prescribed. He thought these tablets were very beneficial, and also favored the local use of protonuclein.

Dr. Talbot said there were certain conditions found in nearly all cases of cancer and tumors which were signs of degeneracy. Almost invariably the patient shows some of the stigmata of a neurotic system. The photograph of Dr. Curtis's patient, for instance, shows marked Mongoloid features, and the jaw shows no germ for the third molar, while the second molar is deformed. There are more of the signs of degeneracy in the jaws and teeth of human subjects than in all of the other parts of the body. The want of proper nourishment of the child from the age of six years and upward has a marked influence on these diseases.

Dr. John S. Marshall said that the case Dr. Curtis described of an osseous tumor of the antrum, and of which he had shown the preparation, was very interesting. The center seems to be bony and the outside looks like a calcareous deposit. It would be interesting if this should be cut and microscopical examination be made to prove its structure.

He wanted only to commend Dr. Latham's paper. She has done her work very carefully. Her description of the gland of Serres is the first full description of this gland ever made. In his paper, Dr. Knight says that multilocular cysts have been described by Sutton as of epithelial origin. Dr. Cryer discovered that the cancelli of the lower jaw communicate one with the other, and that the dental canal is a cribriform canal with apertures into the cells. Now the thought has occurred, may not these multilocular cysts be formed by the percolation from one to the other giving rise to the appearance described?

His experience with diseases of the jaws in cases where a cyst exists about the teeth has taught him to be very radical and thorough when operating. He preferred to be on the safe side,

and would extract teeth and excise thoroughly diseased tissue rather than risk the return of the trouble by trying to save it.

Dr. R. R. ANDREWS said he had had several cases of cysts about the teeth which he had removed, and which had not returned, but they were smaller than the one described in the paper.

Dr. CURTIS asked Dr. Marshall if, in the case of myeloid sarcoma that he operated on for Dr. Latham, the teeth had been separated.

Dr. MARSHALL said the third molar had been removed.

Dr. CURTIS asked if it was possible that the tumor was congenital.

Dr. MARSHALL said the origin may have been congenital.

Dr. CURTIS spoke of the removal of the cystic tumor described by Dr. Knight, and asked whether there was not danger of recurrence.

Dr. KNIGHT said he thought not when the cavity was emptied and a part of the walls cut away, and then the cavity packed with gauze till it healed. He thought the one described by Dr. Latham was an adenoid sarcoma, while Dr. Curtis's case was some form of concretion. It would be impossible to tell just what its nature was without the opportunity for more careful examination. Cystic tumors he had left out of his paper, as they were usually a secondary affection. The primary trouble was usually of an inflammatory nature, which destroyed the end of the root of the tooth. Removal of the tooth in these cases was, of course, absolutely necessary.

The subject was passed, and Dr. W. G. A. BONWILL, of Philadelphia, invited the section to appoint a committee to visit his office to examine the teeth of something less than fifty patients who had been under his care, some of them for forty years, the committee to report back to this section upon the results of his practice. On motion the committee was appointed, and the next morning was set for the time of their visit.

Dr. BONWILL then read a paper entitled "Cataphoresis *versus* the Direct Application of the Galvanic Current for Obtunding Sensitive Dentin, and How to do a Practice that Excludes Both."

Before reading the paper, Dr. Bonwill exhibited to the section a patent granted to him in 1859 for obtunding sensitive dentin by applying the positive pole of a Bunsen battery through a to-and-fro galvanic coil or interrupter, and as well by a strong direct or continuous current. He claimed that by this method he could, without any drug, render painless either the extraction of teeth or the extirpation of dental pulps, except in cases where it was necessary to extract a number of teeth at the same sitting. The method was abandoned, however, because he found that he could more easily arrive at the same result by having the patient breathe rapidly for a few seconds, and this latter method he had practiced ever since.

In his paper, Dr. Bonwill holds that the effect produced by the cataphoric apparatus is not due to any action of the drug used, as he claims that osmosis cannot take place through the substance of

the tooth while it is in the mouth, because it is full of fluids that are not interchangeable by osmosis, unless there can be produced in the pulp-chamber and canals a different density from that of the fluids in the peridentum. Teeth were extracted in this city by electricity as early as 1859, maybe 1856, but it was only by the shock produced at the instant the forceps were applied which produced a diversion of the will-force, by causing a sudden and violent inhalation into the lungs. While the lungs remained inflated the effect was good, for the senses were for the instant submerged or subjugated. He discovered that the sudden inhalation of air thus caused insensibility to pain, and thenceforth abandoned the use of electricity and depended upon rapid breathing alone. "You now know why I abandoned electricity for obtunding sensitive dentin and for extracting, for this revelation of how nature relieves gave me the clue to the brighter step which dentists have been slow to recognize as a fact. Had they done so, then you would not to-day be looking for any other agent in most of the cases that it is our lot to have."

Dr. G. V. I. Brown said that some sixteen years ago he first learned of the utility of rapid breathing to obtund pain, and had frequently made practical use of it. Dr. Bonwill has not taught us how the effect is produced. He thought if the real effect of rapid breathing was better understood, wider use might be made of it than only in dental practice. A study of hypnotism, mesmerism, etc., will show that there are many ways in which a state of disordination of the nerves of feeling may be produced so they will not carry the sensation of pain to the brain, and thus produce anesthesia. The way rapid breathing acts seems to be by diverting the attention from the operation to the effort at rapid breathing. In hypnotism, sleep is produced by occupying the patient's attention, and thus disordinating the centers of mentality and the centers of sensation so that they do not work together. In his paper read before the section of Materia Medica and Therapeutics of the association last year, he quoted the report of a case in which he read the letter of a surgeon who had operated for a tumor of the rectum. The man held his hand and was instructed to keep constant pressure on the nerves of his hand; this will make any one tired, and the effort diverted the attention of the patient from the pain of the operation so fully that the tumor was removed by ligation without any pain being felt, and without the loss of consciousness at any time.

All that seems necessary is to fix the attention of the patient closely on anything while the pain lasts. By rapid breathing and suggestion it is easy to take out a tooth without the patient's feeling any pain, but when it is necessary to amputate the end of the tooth and to work for several minutes it is difficult to control the patient's attention so long without deep hypnosis, and he would like to have cataphoresis for such operations, if he could use it successfully and safely.

He spoke of one case in which a dental surgeon using cocain

with cataphoresis had the gum slough away, as well as an inflammation of the sublingual and submaxillary glands to such an extent as to seriously threaten death from suffocation, and his conclusion was that it was too dangerous for general use upon soft tissues until more thoroughly understood. He had had a patient who had a chronic catarrhal condition of the stomach, which caused pain at certain hours every day, and he taught this patient to breathe rapidly till she had put herself to sleep at the time the pain would have commenced, and so escape the period of pain.

Dr. A. E. Baldwin thought it would be well to caution the younger members of the profession about the use of cataphoresis. He believed the apparent success in cases was from other causes than the cocain. His experience was such that the more he used it the less he liked it. He had heard the most roseate views of the value of the process, but did not think it would stand the test of time, and thought best to be very careful in its use.

Dr. Wilbur F. Litch doubted whether it was possible to get the anesthetic effect of eucain by means of cataphoresis. He had a patient with extremely sensitive teeth, and thought it would be well to try eucain with the electric current. The current was applied and continued for half an hour, gradually increasing it till it amounted to six or seven volts without any effect at all. Then a strong solution of cocain was tried, with complete analgesia in fifteen minutes. This proves, or seems to, that cocain was effective while eucain was not. He thought that while it may be true that a liquid could not be passed through dentin in the laboratory, yet electricity would assist osmosis in the living tooth. He agrees with the other speakers that there was danger in many cases, and that cataphoresis should be used very cautiously. His experience shows him that as good results can be obtained by the use of dry warm air.

Dr. Baldwin said that the case just cited seemed to be almost conclusive that cocain with cataphoresis was effective; the question yet remained to be proved whether the cocain would not have been just as effective without the current. In one case in his practice he applied the current with cocain, and after what he thought sufficient time had elapsed he found no appreciable effect; then he renewed the application for some minutes longer, when the tooth was excavated without any pain. Afterward, upon examining the apparatus, he discovered that no current had been turned on. In fact, he had not used cataphoresis, but had got the result from the cocain which was on the cotton in the tooth.

Dr. H. W. Gillett had listened with interest to the remarks that had been made, and agreed that many of the influences spoken of do act to lessen and destroy pain. He, however, had not been able to produce results as satisfactory with anything else as he could with cataphoresis. Dr. Bonwill doubts that there is such a transfer of fluids into the dentin, sometimes through the dentin into the pulp, as would obtund the sensitiveness of either the dentin or the pulp itself, but thinks the effect is produced by the current alone. In the first full paper published on the subject by the

speaker, he described experiments made to prove that it was not the current, but the cocain that produced the results. The matter has become a craze in the profession, and hundreds of men who use it think that it is electrolysis rather than cataphoresis. The fact that substances may be transferred through other substances by the action of the current in a way that shows they are being transferred has been proven. Iodin can be transferred from one end of a cottonoid strip to the other.

A year ago we felt that osmosis, as applied to the drugs we use, was like a stream that carried chips in its flow, or that the drugs were like nails and the current the hammer that drove them in. We modify our belief now. Some drugs travel from the negative to the positive pole, for instance potassium iodid; these are called anaphoric; others travel from the positive to the negative pole, and are called cataphoric. It is indicated that carbolic acid does not travel at all under the current. It is unquestionably true, however, that many drugs are transferred, and that they are transferred as compound molecules, not resolved into their elements as they would be under the influence of electrolysis. The immediate effect of the direct current as an anesthetic, as detailed by Dr. Bonwill, astonished him, as he had not been able to obtain such effects in his experiments. As to the danger in cataphoresis, there is no doubt but that any drug that will produce profound anesthesia may produce serious injury to the tissue or to the system, and it is well to be cautious. His experiments had been on tooth-structure; he had been content to let others experiment on other tissues. He thought by applying cocain to the gum with cataphoresis for five minutes he could produce sloughing of the gum, and he would not use it so. Perhaps the reason that eucain would not produce its effect cataphorically was that it was an anaphoric drug, and the current would have to be reversed. Desiccation will not meet all cases, and he uses cataphoresis for such cases as he cannot treat by other means.

Dr. R. R. Andrews said that Dr. Clapp, of Boston, used rapid breathing in minor cases with complete satisfaction, and others also in Boston use it. It seemed necessary, however, to get the patient to almost exhaust himself with the rapid breathing to arrive at a satisfactory degree of analgesia.

Dr. Litch spoke of using cataphoresis in extracting living pulps. The operation seemed satisfactory at the time, but the teeth were sore for a long time afterward.

Dr. Andrews said living pulps were extracted with cataphoresis daily in the hospital in Boston with no such trouble.

Dr. Bonwill, closing the discussion, said he did not wish to find fault with any one for using cataphoresis or the electric current for producing anesthetic or analgesic effect. His aim had been rather to place on record what he had done and what he was doing. Rapid respiration was not the only means he used.

The subject was passed, and the time having arrived for the election of officers for the section for the ensuing year, upon motion that business was taken up, and Dr. Jacob L. Williams, of Boston,

was made a member of the Executive Committee to serve three years, and Dr. G. V. I. Brown was elected chairman and Dr. E. S. Talbot secretary for next year.

(To be continued.)

American Dental Association.

The thirty-ninth and final session of the American Dental Association was held in the ball-room of the Chamberlin, Old Point Comfort, Va., commencing Tuesday, August 3, 1897. The proceedings of the first two days did not differ greatly from those of former years. A number of important papers were read and discussed. Then came the report of the committee which had been endeavoring for several years to bring about a fusion with the Southern Dental Association, in order that the entire resources of the dental profession of the whole country might be united in one body. The report favored the union. It was adopted with scarcely a dissenting voice. The members of the two associations met in convention, ratified the action of their conference committees, and formed a new association, a Constitution and By-Laws for the government of which was adopted.

With this action the *motif* for the existence of the American Dental Association was extinguished, and there remained only the formal ending of its career as a living, active force in the progressive advance of dentistry. The closing scenes were solemn; most of those who took part were deeply moved, and a tinge of sadness pervaded the proceedings, as the work of the association was reviewed by those who spoke. There were present two members, Drs. Jonathan Taft and Henry A. Smith, both of Cincinnati, who had been with the association through all its vicissitudes, since the first regular meeting in 1860. Dr. Taft, indeed, participated in the preliminary meeting of the year before, acting as secretary. Each of these gentlemen had been honored with the presidency, and each also had attended nearly all the meetings of the association.

The officers were empowered to close up the affairs of the association, and a resolution was adopted that all the permanent members present at the final adjournment sign the roster, with Drs. Smith and Taft last. It was also directed that the old book, containing the original constitution and the signatures of members, should be deposited in the National Dental Museum and Library at Washington, under the care of the government.

When all who desired to speak had been heard, the president in a few feeling remarks declared the association adjourned without day.

First Day—*Morning Session.*

The association was called to order at 11 A.M., Tuesday, August 3, 1897; the president, Dr. James Truman, of Philadelphia, in the chair.

The session was devoted to routine business, among which was the acceptance of the resignation of the membership of Dr. Morris

L. Chaim, of New York City. The report of the committee on the Horace Wells Memorial, showing a balance of $677.22, was read and referred to the Publication Committee.

Calling the vice-president, Dr. THOMAS FILLEBROWN, of Boston, to the chair, Dr. TRUMAN read the annual address.*

On resuming his seat at the conclusion of the reading, Dr. Truman, in attempting to make a little more room for the vice-president on the narrow temporary platform used as a stage, pushed his chair backward slightly. One of the legs of the chair went over the unguarded edge, and in an instant the president was thrown backward to the floor below. The height of the platform was nearly three feet, and those who rushed to Dr. Truman's assistance expected, from the nature of the fall, to find him seriously injured. Fortunately this was not so. Before those nearest could reach him, he had partially extricated himself from the chair, which went over with him, and he was apparently but little hurt. No bones were broken, the extent of the injuries received being a severe shaking up, several bruises, and a sprained wrist. Dr. Truman was able to preside at the evening and subsequent sessions of the association, and at this writing, more than two weeks after the occurrence, is entirely recovered from the effects of his fall.

Immediately after the accident to the president, the association adjourned to 7.30 P.M.

Evening Session.

The association was called to order at 8.15 P.M.; the vice-president, Dr. Fillebrown, in the chair.

On motion, the president's address was referred to a committee consisting of Drs. J. D. Patterson, H. B. Noble, L. L. Dunbar, H. J. Burkhart, and Grant Molyneaux.

The committee reported, at a subsequent session, as follows:

To the Members of the American Dental Association:

Your committee confidently expect that the proposed union of the American and Southern Dental Associations will shortly be consummated, and their recommendations therefore are made to the association about to be created by such union.

We recommend that all delegates to the association shall be practitioners of dentistry who shall be selected by state dental associations at a regular meeting of the association which they represent; that they shall be men of recognized merit, and duly selected by a majority vote of such state organizations.

We recommend that one delegate shall be allowed for every ten members of such state organization.

Your committee believes that with such careful election of delegates the formation of an aristocracy so forcibly described in your president's address would be prevented.

Your committee recognize the timely recommendation that some method shall be adopted by which a fund shall be created by the national association, which shall be devoted to original investigation; such fund to be used in enabling competent scientists in the profession to prosecute investigations without being harassed by the usual strife and annoyance encountered in dental practice.

Your committee is in perfect harmony with the president when he says

*See page 689, current issue of the DENTAL COSMOS.

that the decree of any state should be a law for all other states, and that a practitioner who is properly licensed in one state should be allowed registration in any, and that this association should advise all of its members to work for the accomplishment of this desirable end.

In regard to dental education and to the conflict which has arisen between the National Association of Dental Faculties and the National Association of Dental Examiners in respect to educational methods in the profession, to which extended reference is made in your president's address, your committee is of the opinion that there is no reason which should prevent harmonious relations between these two bodies. The aims of the National Association of Dental Examiners have been in the proper direction. They have been invested with authority by the various states to guard the community interests where they exist; and while individual members of boards have expressed unwise individual opinions, the public and majority action of the Examiners Association has so far not exceeded their lawful and legitimate functions. They are entitled to our respect, and invite harmony in dental education. Your committee, while concurring in the majority action of the Examiners Association, desires to pointedly criticise the method in some states of granting temporary licenses to practice, and would earnestly advise that efforts be made to change the laws permitting such licenses without any examination whatever. In furthering the intent of the president's address, your committee desires to deplore the lack of interest in the national association evidenced by a considerable portion of both the membership of the National Association of Dental Faculties and the National Association of Dental Examiners, in that they have not and evidently do not desire to work with the national association. So soon as the business of these two associations is finished, many of the members at once return to their homes. This is done in face of the fact that of all associations, the National Board of Dental Examiners and the National Association of Dental Faculties should be the most loyal to national organizations, and thus further the community interests of dental education.

In conclusion, your committee believe that nothing will be gained by exalting the work of one or belittling the work of the other.

After the appointment of the committee on his address, President Truman assumed the chair.

Section IV, Histology and Microscopy, was called and passed.

Dr. FILLEBROWN, chairman of the committee on the union of the American and Southern Dental Associations, stated that his committee had met the committee from the other association, and their opinion was unanimous in favor of union. On his motion the consideration of the report of the committee was made the special order immediately after assembling Wednesday evening.

Section V, Materia Medica and Therapeutics, was called, and Dr. J. S. CASSIDY, chairman, reported that the section had one paper to present, by Dr. Weston A. Price, of Cleveland, Ohio.

Dr. PRICE then read his paper, which was entitled, "The Phenomena of Cataphoresis."*

Dr. M. L. RHEIN, New York City. The question of most interest raised by the paper is as to the means by which medicinal agents pass through the tissues in cataphoric practice, whether by osmosis, or by the liberation of some of their elements and the formation of new compounds. This is a point of great importance, which we must follow up until it is decided. He had personally been doing some work for this purpose on different lines. He had been trying to decide whether the medicines can be diffused through the tissues by osmosis without the aid of the electrical

*See page 702, current issue of the DENTAL COSMOS.

current. There is no doubt that if the pressure theory is correct, we shall be able to get anesthesia by other means than the electrical current. The paper just read reports some valuable results, and makes useful suggestion. Of the latter class especially are its remarks with reference to the use of the milliamperemeter to measure the flow of the current. A great many men are endeavoring to make use of this valuable agent without a milliamperemeter, a practice which cannot be too strongly condemned. Another valuable feature of the paper is the data from many cases carefully recorded. The speaker's opinion with regard to the reduction in the time required for the induction of cataphoric anesthesia is that it will resolve itself into the question of our ability to reduce the voltage at the same time we increase the amount of current passed. As to the means by which this shall be accomplished, he thinks it will be by a change in the points of the anodes. Those at present used are too small; they should be as large as it is possible to introduce in a given size of cavity. This, he believed, would be the line for the reduction of the time limit; and he was encouraged in this belief by the fact that whenever he had been able to follow up failures to properly obtund by personal investigation, he had found that the trouble was in the too small surface acted upon.

Dr. L. E. Custer, Dayton, O., had become so interested in the paper as it was read that he had not thought of any remarks to make upon it. It was a paper well worthy of close study, and he should look it up carefully when in print. It was a monumental paper on the subject.

Dr. J. S. Cassidy, Covington, Ky., in considering the stand taken by Dr. Price as to the play of the ions, had been struck with the idea that the sensory nerve is less susceptible to the cataphoric influence than other tissues. We take it for granted in this work that it is the anode or positive pole which must be presented. It would seem to the speaker that if the effect is to depend on electrolysis, we must use the pole which will repulse if we want to affect the part. If we use the positive pole, it is only the electropositive ions which will try to get to the positive pole. So in the use of peroxid of hydrogen for bleaching a tooth better results would be expected from presenting the cathode or negative pole, as the medicament will penetrate more actively than if the positive pole is used. A solution of iodin is not a good electrolyte, but a solution of a compound of iodin does much better. In such a case, the iodin ions set free will go to the positive pole. Therefore the negative pole is the one to use to get better results. Chlorin, the element, will not do as an electrolyte, but its compounds will. As to the use of some compounds, such as sulfuric acid, if we wish to use the electrical current to cause it to penetrate further into the tissue than by its mere presentation to the tissue, we should get the effect of the acid itself, not of the ions, because the sulfuric acid is decomposed and the sulfion penetrates and meets with the positive ion of water, namely hydrogen; the electrolytic action sets free the oxygen of the water, and the hydrogen with the sulfion again forms sulfuric acid, and this will then react upon the tissue.

Dr. W. St. George Elliott, New York, N. Y., wished to indorse all that has been said as to the value of this paper, for the reason that it has gone deeply into the subject. Most of us are satisfied to demonstrate the practical application of certain theories. Few of us are fitted for the kind of work which produces an exhaustive paper like this, and to properly discuss it we should carefully study and experimentally demonstrate the statements it makes. For himself he has used cataphoric appliances with a fair degree of success, and he thinks that cataphoresis is a field upon which we can all bestow useful time.

Dr. Price wished to say just one word as to whether or not the nature of the electrodes used will shorten the time required to produce the anesthetic effect of cataphoresis. He had tried many experiments to determine that question, with different forms of electrodes, and the patient could tell every time, even with his eyes shut, when a certain point in the amount of current passing was reached. He had tried many combinations for electrolytes, always with practically the same result. He was convinced that the pain caused depended entirely upon the amount of current flowing.

Adjourned to 9 o'clock Wednesday morning.

(To be continued.)

The Projected Union with the Southern Dental Association.

At the evening session of the second day the association was called to order at 8.20, President Truman in the chair.

Dr. W. H. Richards, of Knoxville, Tenn., the president of the Southern Dental Association, being present, was invited to a seat beside the president.

The special order, the consideration of the report of the committee on the union of the American and Southern Dental Associations, was taken up, and Dr. Fillebrown suggested that Dr. L. G. Noel, of Nashville, Tenn., the chairman of the committee from the Southern Dental Association, make a statement as to the position of the members of that association upon the subject.

Dr. Noel, in responding, said that he was happy to say that the movement was progressing favorably, and was now awaiting the action of this association. When the matter was considered by the Southern Dental Association, its members were unanimous in its favor. When the vote was taken on adopting the report of the committee recommending the union of the two bodies, there was one dissenting voice, but the gentleman afterward admitted that he did not know what he was voting on.

Dr. Fillebrown, the chairman of the committee, then read the report, as follows:

Your committee appointed to promote the union of the American Dental Association with the Southern Dental Association have attended to their duty, and beg leave to make the following report.

The union of the two associations seems to them a desirable object to be attained. They have held several meetings in conference with the committee of the Southern Association, and have agreed upon the following points in common, to incorporate in their reports.

They desire to favorably recommend the union of the associations upon the following basis:

First. Providing a new association, with a new name.

Second. Assuring membership in the new association of all the present members of the Southern and American Associations.

Third. Providing for organization of branches in the several divisions, to be formed by the members residing in that division. One of these divisions would be composed of the Southern Association, thus preserving its organization and its history.

Fourth. That the meetings shall be held in each division in rotation.

Fifth. That the president shall be chosen from the section in which the meeting is being held.

The committee recommend that this association meet in convention at some convenient time, to consider the subject of union.

(Signed) THOMAS FILLEBROWN,
B. HOLLY SMITH,
J. Y. CRAWFORD,
J. N. CROUSE.

The report was accompanied by a copy of the constitution and by-laws prepared by the joint committee, but which was not read.

On motion of Dr. C. N. PEIRCE, Philadelphia, the report was adopted.

Dr. JOHN S. MARSHALL, Chicago, moved that the committee on union be requested to arrange for a joint convention of the members of the two associations to consider the subject. So ordered.

The committee subsequently reported having arranged to meet with the members of the Southern Association at 12.30 o'clock, the next day, and on motion that hour was set for the purpose.

SOUTHERN DENTAL ASSOCIATION.

THE twenty-eighth annual meeting of the Southern Dental Association was held at the Hygeia Hotel, Old Point Comfort, Va., commencing Tuesday, August 3, 1897.

FIRST DAY—*Morning Session.*

The association was called to order at 11.15 A.M.; President W. H. Richards, of Knoxville, Tenn., in the chair.

After prayer by Dr. J. Hall Moore, of Richmond, Va., the members were welcomed by Dr. J. V. Haller, of Wytheville, Va. Dr. W. W. H. Thackston, of Farmville, Va., responded on behalf of the association.

The president then read the annual address, which after referring to the struggles through which the dental profession of the United States has reached its present eminence, took up the question of further advancement. The man of science, like the soldier, is of small importance compared to the results desired. Organizations, like individuals, change; they must grow stronger or weaker. No man lives for the good of his fellow-man who blocks the wheels of progress, nor is he remembered for having been an obstructionist. The profession in the United States has a most enviable record. Our task on this account is growing more arduous with each succeeding generation.

Of the two dental associations now assembled on this historic

spot, neither is recognized as a court of last resort. Both feel the burden of responsibilty resting upon them; both are bound by the tie of sectionalism. Several times they have felt the importance of united effort, but as often they have yielded to the persuasive tones of the selfish few, who do not consider the interests of the many. It is when men rise to the point where they are willing to sacrifice their personal desires for the sake of science, that we note an advance in the calling which they represent.

The representative men of the dental profession of the United States, as two associations, both claiming to be national, are here assembled by mutual consent to consider in their separate sessions the question of union. Let us strengthen our courage, forget our differences, unify our purposes, and concentrate our forces; for destiny demands compliance that we may the more effectually stand before the world, not only to practice our profession creditably, but to unite in one common brotherhood every dentist of the United States worthy of the name.

Dr. Richards also hoped that in the event of the union the Southern Dental Association would keep its memory green by retaining its name and changing its constitution and by-laws to conform to the new order, and that its future history as a section of the greater association would be in keeping with its previous work, shining like a star of the first magnitude.

The address referred in feeling terms to the death of Dr. Francis Peabody, of Louisville, Ky. Dr. Richards closed his address with an expression of thanks for the honor conferred in making him president, and of hope that his acts should meet with the approval of his fellow-members.

The address was on motion referred to the committee on union of the Southern and American Dental Associations.

A resolution was adopted, inviting the members of the American Dental Association to participate in the sessions and clinics.

Drs. W. W. H. Thackston, H. E. Beach, and G. F. S. Wright were appointed a committee to prepare a memorial of the late Dr. Peabody.

The consideration of the report of the committee on consolidation with the American Dental Association was made the special order for Wednesday afternoon.

Adjourned to 3.30 P.M.

Afternoon Session.

The association was called to order at 3.30 P.M., by the president.

The section on Operative Dentistry was called, but at the request of the chairman, Dr. FRANK HOLLAND, of Atlanta, the report was deferred.

The section on Prosthetic Dentistry was called, and Dr. W. E. WALKER, Pass Christian, Miss., read a paper entitled "An Obscure Case." In January of 1890, in treating a slight attack of pericementitis of the upper left second molar, he noticed in the roof of the patient's mouth, about midway from the tooth to the median line, an opening about a millimeter in diameter, from which

there was a slight discharge of a thick, glassy-looking tenacious jelly. The patient did not care to have it treated, as it had been there three or four years, causing no trouble except a swelling up about once a year, which passed away in a few days. In December, 1894, the patient again called for treatment of pericementitis in the same tooth, but more especially to have the other trouble attended to. This had then a prominence of the half of a robin's egg, and was so sore as to make deglutition difficult. Near the orifice was a small pustule which lancing proved to be superficial. Pressure caused an exudation of the character first described. There appearing to be a deep-seated pocket of the accumulation, a deep incision let out more of the glairy substance. The wound was then cauterized with nitrate of silver crystals every other day, burning principally in the direction from which the discharge came until a cylindrical cavity six mm. in diameter and nine mm. deep was produced, and no further discharge could be detected. No further trace of the exudation was seen until the granulation-tissue had nearly reached the normal surface, when in place of one large opening there were three small ones.

The patient was not again seen until February of 1897, when the enlargement had returned, though not quite to the dimensions in 1894, making deglutition painful. There was no pustule, but almost constant pain, apparently due to the accumulation of the substance, too thick for free discharge. The accumulation was pressed out, and treatment, continued since, except during the month of March, once or twice a week, has consisted in painting with tincture of iodin. The size of the swelling is slightly reduced, but the discharge continues, and there are now eleven small openings. A specimen resected from the center of the affected area, with a specimen of the discharge, was sent in April to a professor of bacteriology, who is also a specialist in this line of work. He pronounced the growth malignant, probably carcinoma, and advised a more radical operation unless metastasis was far advanced.

No further operation has been attempted, as the writer did not consider it justifiable. The weekly iodin treatment was instituted largely to have the patient call regularly to keep the case under observation. It seems, so far as external appearances go, to have kept the case about in *statu quo*.

Dr. Walker presented two casts of the case, one taken two weeks after the resection for microscopic examination, the other on the first of the present month. He brought the report here for advice, as he had been unable to find a similar case recorded.

The paper was discussed by Drs. John S. Marshall, Conley, Smith, Brophy, Gordon White, and W. T. Arrington.

Dr. Walker then read a paper on "The Facial Line and Angles in Prosthesis."*

This paper was discussed by Drs. Molyneaux, Beadles, Arrington, Crawford, and Patterson.

Adjourned to 7.30 P.M.

*This paper will appear in a later issue of the DENTAL COSMOS.

Evening Session.

The association was called to order at 8.30 P.M., President Richards in the chair.

On motion of Dr. H. J. McKellops, St. Louis, Mo., it was ordered that all members of the Southern Dental Association who have been in the active and reputable practice of dentistry for fifty years shall hereafter be exempt from the payment of dues.

The section on Dental Education was called, and Dr. John S. Marshall read the following paper, entitled "Does the Present Method of Teaching by Didactic Lectures Best Qualify the Student for the Practice of his Profession?"

The spirit of the times is one of progress.

Everywhere in the secular and religious world this is made manifest by the universal desire for improvement. Men in every department of life are seeking after better methods of thought, of living, and of doing things. They are casting aside the obsolete and useless, and are reaching out after those things which give promise of real advancement and improvement, though they may be never so small.

In the arts and manufactures, in science and religion, this earnest desire is uppermost.

The age is also a practical age, and every thought, enterprise, or endeavor must have its practical side in order to claim the attention of the people. It is an age which has no patience with worn-out ideas, methods, or dogmas.

Forward is the watchword, and *practical excellence* the motto, and woe betide the individual, the corporation, the educational institution, or the church which takes no cognizance of the spirit of the time.

For several years this spirit of progress has been "moving upon the face of the waters" and stirring the stagnant pools of our educational institutions. The foremost educators of our land are seeking for better methods of teaching, better preparation of the knowledge to be imparted, by arranging and classifying it upon the most approved scientific plan, so that it may be the more readily comprehended and retained.

Knowledge to be of value must be useful. To be useful it must be classified. When classified it is accessible and capable of being applied to the subject under consideration.

The faculties of the dental colleges have not been unmindful of their obligations to the student, nor of the spirit of the age, and have tried to keep their institutions well to the forefront in this "onward march of progress." They have recognized the growth of the profession in its various departments, and have endeavored to keep pace with it. Many additions have been made to the course of study of the schools during the last few years, but nearly all of them have been upon the practical side, in the line of technique and laboratory work.

There is, however, great need of improvement in other directions, particularly in the present method of teaching by didactic lectures. The teaching in this line is just the same to-day that it

was fifty or sixty years ago. A few colleges have made an attempt at improving the teaching in this direction by the introduction of other methods in combination with the lecture courses, but there has been no real advancement made which can compare with the work now done in the technique rooms and the laboratories.

In this respect we are behind the times, and need to bestir ourselves if we would maintain the reputation of the American dental colleges and the prestige of our graduates.

I shall, therefore, to bring this important matter to your attention, take the liberty of propounding the question which forms the title of this paper, briefly state my own views upon the subject, make a few suggestions, and then leave the matter in your hands for discussion.

Does the present method of teaching by didactic lectures best qualify the student for the practice of his profession?

My reply to this question is, No!

My reasons for this negative answer have grown out of a considerable practical experience, covering a number of years as a teacher in medical and dental schools. I can therefore approach the subject with the feeling that I am not a novice, and that perhaps out of this experience and observation I may be able to suggest a better method of educating the students under our care than by this inadequate and antiquated method of the past. I am fully aware, however, that many of my colleagues have also felt the inadequacy of the lecture method to *instruct* and *educate* in the best sense of the terms, and of their desire for a better means of placing before the students the subjects which they desire to teach. I feel confident, therefore, that out of this discussion good must come, and that if the suggestions contained in this paper do not meet with your approval, something better will be evolved.

My first objection to the didactic lecture method of teaching is that there are very few men in the profession who have the eminent qualifications to make successful teachers under this system.

The power to write eloquent sentences, to display oratorical pyrotechnics, and compose brilliant climaxes, are not qualifications for teaching. The orator and the stump speaker have no place in the class-room.

Entertainment of the students by funny stories is not the highest duty of the instructor. The paramount qualification for the office of teacher *is ability to impart knowledge and to teach the student how to apply it;* but how few there are who possess both of these important qualifications.

Many teachers are apt to impart knowledge, but few have the eminent qualification for the important labor of teaching how to apply it. Knowledge without this power is like a library without a reader, "more ornamental than useful."

My second objection is based upon the undisputed fact that a large majority of the gentlemen who occupy positions as teachers in our dental schools are busy practitioners, whose time is most fully occupied by professional duties, but who for the love they

bear the profession are willing to give the best of the energy left to them each day to preparation for the duties of the lecture-room. Not one of these gentlemen, however, would say that such effort is the best that he is capable of doing had he more time for preparation and more energy to put into it. This objection can never be overcome until such time as men of wealth will endow these institutions, and thus make it possible for the schools to pay their professors a salary that will be sufficient to preclude the necessity of keeping up a practice for the sake of the income. Under such circumstances the entire time of the professors could be given to the duties of teaching and of original investigation; conditions which are greatly needed, and devoutly to be hoped for.

Another class of teachers go before their students with evidently some preparation upon the subject to be taught, but who frequently side-track themselves over the relation of some pet case in practice, and never get back to the text again that day. While another class, all too numerous, often enter the lecture-room with little or no preparation, and simply talk against time, rambling over the entire field comprehended in the curriculum, and when the students leave the lecture-room they have no more than when they entered it, while their minds have become so befogged by this *hodge podge* to which they have listened that they have no clear comprehension of the subject supposed to have been taught. This is not an overdrawn picture, for many of you know of like conditions, and the causes which have produced them.

My third objection is based upon the fact that no matter how eminent and well qualified the teacher may be as a lecturer, the students do not obtain such benefit from his wisdom as they have the right to expect and demand, for the reason that it is impossible for the average student—and this is the class that we have to plan for—to remember more than a few of the most striking thoughts presented in each lecture; while upon the other hand, if the student attempts to take notes, he loses at least one-half of the lecture, unless he happens to be proficient in shorthand. In some of our schools the various classes have been in the habit of employing a stenographer to report each lecture upon certain subjects, and then have them printed for the use of the class, as the only means by which they could get the full benefit of the teaching.

The fourth objection which I would raise lies in the fact that, as a rule, the students show their greatest weakness at the time of examination in those subjects in which they have been obliged to depend in a large measure for their information upon a course of lectures. Listening to a course of lectures, and studying the same subject from a suitable text-book, are not to be compared as a means of education.

To remedy these defects in this method of teaching, I would suggest that each lecturer should furnish to his faculty a full and complete syllabus of his entire course of lectures, and that the same be printed for the use of the students. These should be distributed to the class, one lecture at a time, as may be indicated by the teacher when he goes before his class. In this way the class

could readily follow the lecture during its delivery, and be relieved from the necessity of taking notes, which at best are inadequate to a good understanding of the subject. Furthermore, the class should be quizzed upon each lecture by the teacher himself, or by an instructor especially appointed for this purpose, who is in sympathy with him. The syllabus should be used in this work instead of a quiz compendium. By this plan the lecture method might be stripped of many of its objectionable features. The teaching from the lecturer's desk and the work in the quiz-room would then be uniform, and the most would be made out of this system of teaching that the circumstances would permit.

With these improvements in this method of teaching, it would still be far from all that is needed, for many of the defects would remain without a remedy. I firmly believe that our whole system of oral teaching needs to be revolutionized by the introduction of suitable text-books and a system of recitations.

To my mind, the recitation system of instruction is by far the most satisfactory upon all subjects not purely clinical or manipulative. It has been my experience, that students who have been required to study a certain number of pages each day from a suitably prepared text-book, with the assurance that they would be closely quizzed upon each lesson, have shown a much better understanding of the subjects studied than those who have been educated by the old system of didactic lectures.

Furthermore, by the use of carefully prepared text-books, a systematic plan of study is followed, and the subject matter is classified and arranged in a natural order. Material prepared in this manner is much easier to comprehend and to remember, while the student is taught correct methods of thought, and to reason from cause to effect.

By following the recitation method of teaching the best instruction could be obtained from recognized authorities in the various departments to which this plan applies. The selection of the text-books might be placed in the hands of a special committee of the faculty, who should, after conference with the professors of each department, announce to the students the books that would be required for each school year. In the selection of a faculty, it has been the custom under the old plan to appoint the men of best minds, and of the largest experience in special departments, to work in the lecture-room; while the younger men who have their reputations still to make have been placed—to my mind—in the most important positions, as teachers in the laboratories and the clinic-rooms.

By the adoption of the recitation system of teaching the younger men would be placed in charge of the instruction in the recitation-room, with orders to follow the teachings of the authorized text-book. The application of the knowledge thus gained should be taught in the laboratories and clinic-rooms by the professors themselves, rather than by a corps of demonstrators whose knowledge of and experience in the special subjects to be taught is often of the most limited nature.

With such a change in our system of oral teaching, I believe much greater advancement could be made by the students in the same length of time, and we should have the satisfaction of knowing that they were better qualified for the practice of their profession than by the old method.

In conclusion let me ask,—

Are these suggestions too radical? Are they based upon common sense? Are they practical?

The answer to these questions rests with you.

The paper was discussed by Drs. J. Taft, H. J. McKellops, W. C. Barrett, I. N. Carr, L. M. Cowardin, J. Y. Crawford, and Dr. Marshall.

Adjourned to 10 o'clock A.M. the next day.

(To be continued.)

At the session Wednesday afternoon, the committee on union with the American Dental Association presented their report, which was read by Dr. L. G. Noel, of Nashville, chairman. The report was almost identical with that presented by the committee of the American Dental Association (see page 756), except that it provided for the continuation of the Southern Dental Association as a branch of the proposed new National Dental Association.

The Constitution and By-Laws for the new association, which had been prepared by the joint committee, was also read by Dr. Noel.

Dr. J. Rollo Knapp, New Orleans, offered a resolution that it is the sense of the association that the report of the committee be adopted and that the union be effected.

A lengthy discussion arose as to whether the acceptance of the report included the adoption of the Constitution and By-Laws without opportunity for amendments if so desired. It was finally decided that the Southern Dental Association was not competent to amend a constitution which was to govern both associations—that that must be the work of the joint meeting.

Dr. Knapp's resolution was carried on motion of Dr. B. Holly Smith, Baltimore, after the discussion and decision above stated.

On motion of Dr. L. M. Cowardin, Richmond, Va., a committee was appointed to wait upon the American Association and fix upon a time for "effecting the object that we have voted to be desirable."

After the formation of the National Dental Association, elsewhere reported, the members of the Southern Dental Association reorganized as the Southern Dental Association Branch of the National Dental Association, and elected the following officers for the ensuing year: Dr. E. P. Beadles, Danville, Va., president; Dr. W. E. Walker, Pass Christian, Miss., first vice-president; Dr. T. P. Hinman, Atlanta, second vice-president; Dr. F. P. Welch, Pensacola, Fla., third vice-president; Dr. B. D. Brabson, Knoxville, Tenn., treasurer; Dr. C. L. Alexander, Charlotte, N. C., corresponding secretary; Dr. S. W. Foster, Atlanta, recording secre-

tary; Drs. V. E. Turner, Raleigh, N. C.; S. B. Cook, Chattanooga, Tenn.; W. T. Arrington, Memphis, Tenn.; R. K. Luckie, Holly Springs, Miss.; W. R. Clifton, Waco, Texas, and H. E. Beach, Clarksville, Tenn., executive committee.

St. Augustine, Fla., was selected as the place for the next meeting, the date to be fixed by the Executive Committee.

NATIONAL DENTAL ASSOCIATION.

PURSUANT to action taken by the American and Southern Dental Associations, as elsewhere reported, the members of the two bodies met in convention in the pavilion of the Hygeia Hotel, Thursday, August 5, 1897, at 12.30 P.M., for the formation of a national association which should command the united efforts and support of the entire profession.

The convention was called to order by Dr. THOS. FILLEBROWN, chairman of the committee on the part of the American Dental Association, who nominated Dr. JOHN B. RICH, of Washington, D. C., for temporary chairman.

Dr. RICH was unanimously elected, and assumed the chair.

Dr. W. E. WALKER, Atlanta, Ga., and Dr. GEORGE H. CUSHING, Chicago, were chosen as temporary secretaries of the meeting.

Dr. JOHN D. PATTERSON, Kansas City, Mo., offered the following resolution, which was adopted:

Resolved, That the members of the American Dental Association and the members of the Southern Dental Association do hereby organize themselves into a body to be known and styled the National Dental Association.

Dr. JOHN S. MARSHALL, Chicago, Ill., offered the following, which was likewise adopted:

Resolved, That the Constitution, By-Laws, and Rules of Order decided upon by the joint committee of these two bodies be and are hereby adopted as the Constitution, By-Laws, and Rules of Order of the National Dental Association.

Dr. W. H. RICHARDS, Knoxville, Tenn., moved that no speaker shall speak more than three minutes at one time without the consent of a majority of this convention. So ordered.

Dr. T. W. BROPHY, Chicago, moved to proceed to the election of officers, but, after some discussion, the motion was laid on the table on motion of Dr. Louis Ottofy, of Chicago.

On motion of Dr. E. P. BEADLES, Danville, Va., the Constitution, By-Laws, and Rules of Order were read by Secretary Walker.

The following are some of the more important new features incorporated in the Constitution:

ARTICLE XII, SECTION 3. For the purposes of this association, the United States shall be divided into three divisions, to be called the East, the South, and the West.

The Eaist shall include New England, New York, New Jersey, Pennsylvania, Ohio, Indiana, the lower peninsula of Michigan, and Ontario.

The South shall include Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, Kentucky, Tennessee, Arkansas, Oklahoma, and Indian Territory.

The West shall include Illinois, Wisconsin, the upper peninsula of Mich-

igan, Minnesota, Iowa, North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado, Idaho, Utah, Washington, Oregon, Nevada, California, Arizona, and New Mexico.

ART. III, SEC. 3. All delegate members shall be practitioners of dentistry. They shall be received only from permanently organized state dental societies having definite conditions of membership other than pecuniary. They shall be elected by ballot at some regular meeting of the society and shall be members who have done some meritorious work for the profession, but no person shall be received as a delegate who is in arrears for dues to this association.

ART. III, SEC. 5. It is hereby specially provided that all persons at present permanent members of the American Dental Association and of the Southern Dental Association are permanent members of this association, and entitled to all the privileges of the class to which they belonged, without further action, and the treasurer is hereby directed to transcribe their names upon the roll of membership of this association.

ART. VI, SEC. 4. After 1897 the president shall be chosen from the division in which the meeting is being held.

One of the vice-presidents shall be chosen from each section, namely, one from the East, one from the West, and one from the South, and shall rank by seniority.

ART. XII, SEC. 1. The regular meetings of this association shall be held annually on the first Tuesday after the last Saturday in August, or at such time as shall be determined by ballot of the association.

ART. XII, SEC. 2. The place of meeting shall be determined each year by vote of the association, except that the place of meeting shall be in the West in 1898, in the East in 1899, and in the South in 1900, and thereafter in the order named, meeting in each section every third year.

ART. XIII, SEC. 1. This association shall be divided into ten sections, as follows:

1. Prosthetic Dentistry, Metallurgy, and Chemistry, including Crown- and Bridge-Work.
2. Dental Education, Literature, and Nomenclature.
3. Operative Dentistry.
4. Histology and Microscopy.
5. Materia Medica and Therapeutics.
6. Physiology and Etiology.
7. Anatomy, Pathology, and Surgery.
8. Hygiene and Prophylactic Dentistry.
9. Orthodontia.
10. Clinics.

ART. XIV, SEC. 1. For the wider diffusion of the benefits of this association, the members of each division may form themselves into one or more separate bodies, to be styled "Branches."

ART. XIV, SEC. 3. Each branch shall be free to hold meetings and to govern itself as its members shall think fit, but no branch law shall be valid which, in the opinion of the National Association, may contravene any fundamental law of the association.

ART. XIV, SEC. 4. Each branch shall pay its own expenses, and no branch shall be deemed for any purpose the agent of the association, or have power to incur any obligation in its behalf.

Dr. R. OTTOLENGUI, New York, N. Y., moved to take the resolution for the election of officers from the table, and that the election be proceeded with. So ordered.

Dr. C. S. BUTLER, Buffalo, N. Y., moved the appointment of two tellers to conduct the election. The motion prevailed, and Drs. H. B. Noble and R. Finley Hunt, of Washington, D. C., were appointed.

The association then proceeded to take an informal ballot for president. Ninety-two votes were cast, of which Dr. Thomas Fillebrown received 51; Dr. B. Holly Smith, 5; Dr. W. W. H.

Thackston, 5; Dr. James Truman, 7; Dr. T. W. Brophy, 11; scattering, 13.

On motion of Dr. J. Hall Moore, of Richmond, Va., the informal ballot was made formal, and Dr. Fillebrown was declared elected president.

Drs. Truman and Richards, presidents respectively of the American and Southern Dental Associations, were appointed a committee to escort the new president to the chair, where he was received by Dr. Rich, who, after formally introducing Dr. Fillebrown to the association, resigned the gavel to his hands.

Dr. Fillebrown returned his thanks in a felicitous way for the honor conferred upon him.

The association then adjourned till 4.30 P.M.

The association was called to order at 4.40 P.M., President Fillebrown in the chair. As the first order of business, the president called for the election of a recording secretary.

Dr. George H. Cushing, Chicago, was elected secretary, and on motion of Dr. Peirce was authorized to cast the ballot of the association for Dr. W. E. Walker, of Pass Christian, Miss., for assistant secretary.

The association then proceeded with the election of the other officers. The following were elected: Dr. James McManus, Hartford, Conn., vice-president from the East; Dr. L. L. Dunbar, San Francisco, vice-president from the West; Dr. B. Holly Smith, Baltimore, vice-president from the South; Dr. Emma Eames Chase, St. Louis, corresponding secretary; Dr. Henry W. Morgan, Nashville, Tenn., treasurer.

Dr. E. P. Beadles, Danville, Va., moved that for this occasion the president be authorized to select the members of the Executive Committee. So ordered.

The president later announced the Executive Committee as follows: For three years, J. N. Crouse, Chicago; V. H. Jackson, New York City, and L. G. Noel, Nashville, Tenn.; for two years, M. F. Finley, Washington, D. C.; J. D. Patterson, Kansas City, Mo., and H. A. Smith, Cincinnati; for one year, George Eubank, Birmingham, Ala.; W. P. Dickinson, Minneapolis, and C. N. Peirce, Philadelphia.

Dr. John S. Marshall, Chicago, offered the following resolutions, which were adopted:

Resolved, That the treasurer of this association be directed to request the treasurers of the American Dental Association and of the Southern Dental Association to furnish him with the lists of the permanent members of their respective associations, and he is hereby directed to add the names so furnished him to the constitution of this association, as set forth in the provisions of membership in Art. III, Sec. V, of the constitution; and be it further

Resolved, That said act of the treasurer shall be legal and binding, the same as if the signatures had been attached by the persons themselves.

For the next place of meeting Omaha, Neb., was selected.

Dr. Marshall offered the following, which was adopted:

Resolved, That a committee of three be appointed by the president of this

association to take into consideration the question of establishing a journal for the publication of the transactions of this association and other original matter pertaining to dental surgery and collateral sciences, and that they report to this body at the next annual meeting.

The committee subsequently appointed under this resolution consists of Drs. John S. Marshall, J. Taft, and L. G. Noel.

Dr. J. Y. Crawford, Nashville, offered the following resolution:

Be it Resolved, That it is the sense of the National Dental Association that when any member of the dental profession, in good standing, presents a certificate of registration from any state in the Union, that the same should be admitted to registration in any other state in the Union, when presenting such certificate of registration and good standing professionally, without an additional examination.

This resolution was adopted.

The following, offered by Dr. Henry W. Morgan, was adopted:

Resolved, That the two associations, American Dental Association and Southern Dental Association, participating in this organization, be requested to contribute a dollar per member to the treasury of the National Dental Association, and that in view of this contribution all dues be remitted for the year 1897 to those on the lists of these respective associations in good standing.

Dr. R. Finley Hunt, Washington, D. C., offered a resolution providing for the appointment of a committee of three, to report at the next annual meeting, with regard to the preparation of a full history of the dental profession. The resolution was adopted, and the committee was named at a later session, as follows: Drs. Chas. McManus, R. Finley Hunt, and Gordon White.

Adjourned to 12 o'clock Thursday.

Second Day.

The association was called to order at 1 o'clock P.M., President Fillebrown in the chair.

The Executive Committee reported having organized, with Dr. J. N. Crouse as chairman and Dr. M. F. Finley as secretary. First division, Drs. Crouse, Noel, and Smith; second division, Drs. Jackson, Patterson, and Finley; third division, Drs. Peirce, Dickinson, and Eubank.

The organization of the sections was reported as follows:

Section I. *Prosthetic Dentistry, Metallurgy, and Chemistry, including Crown- and Bridge-Work.*—Grant Molyneaux, chairman; R. R. Freeman, secretary.

Section II. *Dental Education, Literature, and Nomenclature.*—B. H. Catching, chairman; M. F. Finley, secretary.

Section III. *Operative Dentistry.*—J. Y. Crawford, chairman; Frank Holland, secretary.

Section IV. *Histology and Microscopy.*—J. I. Hart, chairman; T. P. Hinman, secretary.

Section V. *Materia Medica and Therapeutics.*—J. S. Cassidy, chairman; L. P. Bethel, secretary.

Section VI. *Physiology and Etiology.*—J. D. Patterson, chairman; L. E. Custer, secretary.

Section VII. *Anatomy, Pathology, and Surgery.*—W. C. Barrett, chairman; Geo. D. Clements, secretary.

Section VIII. *Hygiene and Prophylactic Dentistry.*—W. T. Arrington, chairman; A. H. Thompson, secretary.

Section IX. *Orthodontia.*—V. H. Jackson, chairman; L. P. Dotterer, secretary.

Section X. *Clinics.*—H. J. McKellops, chairman; E. P. Beadles, secretary.

The president reported that the following members of standing committees had been appointed: Drs. A. W. Harlan and V. E. Turner, publication committee; Drs. Wms. Donnally, H. W. Morgan, and Thos. Fillebrown, committee on national museum and library; Drs. S. H. Guilford, Grant Molyneaux, and S. W. Foster, committee on terminology.

Dr. CROUSE offered the following as a standing resolution, and it was unanimously adopted:

Resolved, That any member of the dental profession who has been in reputable practice for a period of fifty years may be elected to permanent membership in this association without the payment of dues, and any member of this association who has been in practice for a like period shall have his dues remitted thereafter by presenting the fact to the treasurer of the association.

Dr. M. F. FINLEY, Washington, D. C., offered the following, which was adopted:

Resolved, That the Committee on National Dental Library and Museum be authorized to seek in the interest of public health the employment at government expense of at least one dentist of eminent fitness in the Army Medical Library and Museum, whose time when so employed shall be devoted to the advancement of dental science.

A resolution offered by Dr. TAFT for the appointment of a committee of three to confer with state and local societies and to assist and foster new societies when and where desirable was adopted, and Drs. J. Taft, J. Y. Crawford, and James McManus were appointed as the committee.

Dr. CROUSE moved that a committee of one from each state and territory be appointed to work in the interest of the Dental Protective Association, and to see that all delegates sent to this body are members of that association.

On motion of Dr. RICHARDS, the American and Southern Dental Associations were requested to turn over their gavels to be properly engraved and stored away with the archives in the National Dental Museum at Washington.

Dr. CRAWFORD offered an amendment to the constitution to change the name of the association to the American Association of Dental Surgeons.

Dr. THOS. C. STELLWAGEN, Philadelphia, offered an amendment changing the name to National Association of Stomatologists.

Dr. S. H. GUILFORD, Philadelphia, offered an amendment changing the name to American Association of Dental Science.

Recess taken to two o'clock.

On the association reconvening at the hour named, Dr. Crawford moved the adoption of his amendment to the constitution,

but objection was made by Dr. R. Finley Hunt, and the amendment went over, with the others, till next year.

The association then adjourned to meet in Omaha, Neb., August 30, 1898.

Dental Society of the State of New York.

(Continued from page 643.)

Following is the discussion on the papers of Drs. James Truman and B. Holly Smith, for which see the Dental Cosmos for July, page 543, and August, page 614:

Dr. W. W. Walker. It gives me much pleasure to welcome our illustrious friends, Dr. Truman and Dr. Smith. I claim there is no person in this country who has done more, or as much, for the elevation and advancement of our profession than Dr. Truman, and there is no person who is more able to speak on this subject, or write upon the organization of dental societies, than Dr. Truman. As for Dr. Holly Smith, I claim there is no young man who is more capable of speaking on the subject than he is. It only seems three or four weeks ago that I had the pleasure of meeting him at one of the New Jersey societies; later he came from Baltimore to attend a meeting in New York city; but a short time ago he gave up two or three days of his time in his own city, during the commencement of the college with which he is connected; the early part of the week he devoted to Old Point Comfort, to the associations of Maryland and Virginia, and now we find him in Albany with us. As I said before, I know of no young man who gives up more time to the dental profession than Dr. Holly Smith. In opening the discussion of Dr. Smith's paper, there is very little left for me to say. He mentioned the organization of the dental societies in our state, but did not tell us anything new. He said they were the finest in the world; we all know that, because we have worked shoulder to shoulder for that purpose, and we have accomplished it. No state in the Union has the local organizations that the state of New York has, and that is why we have such successful meetings here at Albany. In regard to our local societies, he spoke of the advantage the young men derived by joining them, —young men who are taken out of the cheap advertising places, who have been compelled to go there to gain a living. We take those young men sometimes into our societies, and in time they turn out to be some of the most valuable members we have. He forgot to mention those who have made reputations in our different societies, and have allowed themselves to become non-members, and have sent in their resignations and then advertised in the papers. Recently, in the city of New York, there was a case of that kind. There was published in one of the New York papers almost a life-size picture of a dentist who had received nearly all the honors he could receive from us, and the article said this man had received a call to attend to the teeth of one of the nobility of Europe,—that he had been on the clinic committees; that he belonged to the Odontological Society, the Stomatological Society,

and a number of others. The papers took it up all over the country, because that man happened to be connected with some college. That was nothing but an advertisement. Some one told me that he did not think this person would ever publish his second volume, because the man who wrote the first for him was dead. There is one thing in our larger societies that is perhaps not as interesting as formerly. There are too many local societies in close proximity to each other. They are all looking for the best material they can find. They go all over the country for it. Nothing new has been presented in the dental societies in our cities this winter, except perhaps something on cataphoresis, and the paper of Dr. Williams, of London (formerly of New York). When the local societies scour the country for material, what can we bring to the state society? How can we make the state society interesting? The people who are paying attention to these national organizations should think of that point.

The state of New Jersey is one of the most interesting states for dental meetings that there is. In midwinter, when you can hardly get ten people to a local meeting in New York, you can fill the hotel in Newark with two hundred or three hundred.

There is one thing I want to speak about regarding the Southern Dental Society and the American Dental Association. It has afforded me great pleasure to visit the Southern Dental Society; there you have dentistry pure and simple, and that society should not be allowed to die. The difference between it and the American Dental Association is this: Eight or nine years ago it was a pleasure to attend a meeting of the American Dental Association, because in those days everything was dentistry there; but what has it grown to be? There are meetings of the National Board of Faculties, the National Board of Examiners, the National School of Technique, and I remember at the time of the World's Columbian Dental Congress all the different committees had to meet and do their work in three days. What time was there left to devote to the sessions of the association? The men who went there with all these committees to attend would attend to them first. They forgot that the American Dental Association was in session. Often you would have to drum up a quorum, and you found the men in the different committee rooms. Eliminate all these committees from the American Dental Association and meet at a different time of the year, and you will have one of the grandest dental associations in the world. I was talking to the president of the Society of Engineers in the city of New York, and he said the same thing almost killed that society. He said that when people came to New York they had so many things to look after they neglected the meetings. If we start this national association that Dr. Truman and Dr. Smith speak of, if they can keep all these different committees away from it, it may turn out to be a grand institution; but they must try to have only that one thing and nothing else.

Dr. WILLIAM JARVIE. Notwithstanding the mild censure contained in the paper of my dear old friend, Dr. Truman, upon the

societies who go outside their own membership to get papers, we are very much delighted and complimented to have him here to-night, and Dr. Smith to keep him company. In societies such as these there are two kinds of work to be done, the legislative and the scientific; and while we would place the scientific high above the other, we must not lose sight of the important part that the legislative work of this society has played in the last thirty years, —a work as important in its line as any other society in the country has done in its legislative and scientific work combined. Let us look at that phase of the question. Thirty years ago, when this society was organized, the dental profession had a very different status from what it has to-day. The laws that were adopted in this state making greater requirements of those who might enter the dental profession, and requiring boards of dental examiners, made it known that many of the men who had been practicing for many years were sadly deficient in many things that brought a dentist up to the standard, even at that time. Dental colleges found it necessary to raise their standard; they increased the time of attendance necessary for graduation from two years to three years. They required a preliminary examination before admission to the college, and while we have not yet an ideal law in this state, we have a law so good and its requirements so high that it requires the same intelligence and the same education for a man to enter upon the study of the dental profession to-day as it does to enter upon the classical studies of a college or a university, or a medical or law school. That is a most important work, I think you will admit. The question as to dental societies and how best to conduct them so the best can be gotten from them is very pertinent at the present time.

It seems to me that our dental societies are in just that condition that some new steps need to be taken to keep up their interest, their usefulness, and make them what they ought to be. Professor Truman has pointed out in his paper the wisdom of requiring all members of societies to write a paper at least once in two years. I thoroughly believe that every dental organization ought to be a mutual benefit society; every member of that society ought to contribute something to the general good, and a few men should not be required or permitted to do all the work or all the talking. Some means should be taken to have every man take part in the proceedings of the society. If he did not write a paper, he should prepare himself to take part in the discussion. Take for instance the meeting of to-day; every gentleman present has known beforehand the subjects that were to be discussed, but very few have taken part in the discussions. To be sure, it may be said there has been no time. It has been a very busy day, and undoubtedly will be a busy session of the society, but every member ought to be required to do something toward the benefit of the whole. This ought to be so in our district societies, our state societies, and our national organizations. Both the essayists have paid a well-merited tribute to the organization of the dental profession in this state. It is well organized, and I think in the organization of a

new national association that the lines upon which this society is organized ought to be adopted in all the states. The same division of territory is not practicable, of course, but other divisions of territory might be made that would be equally effective, so that each state might be divided and have its local society for each district, delegates from those societies making up the state society, and delegates from the state society to make up the national organization. You would then have the dental profession throughout the United States thoroughly well organized,—a power that could make itself felt in legislation and scientifically. I should only repeat what the other speakers have said if I should say anything as to the urgency of taking some means of assisting those who are inclined to original research. A man who has the ability of making original research must of necessity devote a great deal of time to it, and he must devote that time to it to the neglect of his ordinary practice. It would be utterly impossible for a man in full daily practice to carry on much work in original research. The rest of us who are in practice and who take advantage of these original investigations, should be ready to help by rendering pecuniary assistance. I think this is what all dental organizations should take up. If you notice the secretary's figures to-day, in telling of the departments in which the different applicants for certificates failed in this state, you will see that there were hardly any that failed in operative dentistry, or prosthetic dentistry; it was principally in histology, therapeutics, anatomy, and pathology that they were deficient. If we will assist in the scientific work of those who are so inclined, we will aid in something which you will see is needed very much.

In regard to the formation of a national organization, I beg all those who have that matter in charge not to hold those meetings in August. It deprives many men of the pleasure of attending, and when a man has been working hard and gets off for a short time, he does not like to break up his vacation by attending a dental meeting. If you have them in February or March, after a man has been hard at work for six months and needs a little recreation and change, it would be better.

Dr. OTTOLENGUI. I would like to say a few words in reply to Dr. Jarvie. I would not belittle the legislative work and the influence of that work by this society. We probably had formulated and passed the best law regulating the practice of dentistry, and it is probably true that it is a benefit to the state to have such a law. But there is another side to the question. We cannot have laws without having them very well known. Were there no law licensing men to practice dentistry, every man who had teeth to fill would question whether the person whom he had been advised to patronize were a fit person; as it is, every man has been licensed to practice, and every man is therefore supposed to be capable; and it seems to be a fact which we may vainly try to evade that there are more charlatans and quacks to-day than there were before the law was passed. But to-day they are licensed, whereas they formerly were beyond the pale. These men have the finest outfits

and the latest appliances which dental depots can supply, and they have more money with which to run their offices than many reputable men. We have, as I understand it, in the state of New York, something over four thousand dentists; five hundred and fifty-five of them are in our societies. We can probably then hold our hands up and say "God bless you" to so many; but what can we say to the others? Yet they are all registered and licensed dentists.

I would like to say a word about the organization of a national body. It seems to me that we do not need a national body which shall be very large and cumbersome. I think the American Dental Association might be continued as a tributary to the national body; that the Southern Dental Society might be continued as a tributary, and one or more large tributaries might exist out West. To these bodies let the state societies send their delegates, and have their permanent memberships, if you choose; but, as Dr. Truman suggested, let membership in the national society mean a reward for that work which Dr. Jarvie says must be stolen from pleasure,—that work which cannot be done between nine and six. It must be done between six and nine, and those men who are willing to give up the theater, the club, the lodge, and other pleasures which they would have, to pursue scientific matters, are not men who are looking for money; they are trying to attain something, and as we are now organized they get very little credit for it. In England it is a great honor to be known as F.R.S. Dr. Tomes, or Mr. Tomes, as he calls himself, is an F.R.S. To be elected a member of that society means something. To be elected a member of any society in the United States merely means having money or political influence. Consequently it would be a good thing to have a national organization, to be called the National Society of America, and a member of that should be F.N.S.,—Fellow of the National Society,—and he should get it as a reward of merit. When he becomes a member he should be a permanent member, for when a man has once deserved that distinction I fail to see how it can be taken away from him. I am particularly pleased to find that Dr. Truman advocates our being a distinct organization,—an organization with fondness, perhaps, for the medical profession, but admitting at least that we have a separate existence, that we are big enough and old enough to manage our own affairs. I want to say (what will probably be unpopular) that it seems to me distressing that the word "stomatology" is becoming so popular. To call a national body a "stomatological" society would be a misnomer, and yet I understand that has been suggested. How can we become stomatologists while we are giving our graduates degrees of D.D.S.? I have no objection to calling men stomatologists if we have a college which will tell us what stomatology is. Ask a man if he is a stomatologist, and he will admit it; ask him if he is a dentist, and he cannot admit it unless he has something to show for it. The name "stomatology" means nothing, and it is merely an emotional instinct which has given it birth.

Dr. CROUSE. I have been a member of the Illinois State Dental Society and have attended all its meetings except two for thirty

years. Last year I was called to court by the Dental Protective Association, and this year I had to be here for this meeting. I have been a member of the American Dental Association and paid my dues. I have been doing things that other men did not want to do,—make arrangements and tussle with the railroads, watch the credentials to see that nobody got in without paying dues, and such things. People who did not want to tackle a man at home would dare him to come to the American Dental Association, and when he put in his credentials I would pull out and ask him if this was his authority. Old Dr. Sheffield came there with his credentials before I ever knew who he was. I sat at the table with my book and he came in. Ahead of him had come a lot of his advertisements. When I asked him if he was authority for those documents, he wanted to know where I got them. An intimate friend of his told me he said many times it was the most fatal thing to his happiness that ever happened. He went home and spoke of it afterward as being the greatest rebuff he had ever met. I speak of this to show that laws are necessary. It is not enjoyable to hold a man off like that, although I did not do much blushing about it; so we made it a rule that delegates should come with a clean record. It has done more in the last eighteen years to make local societies keep their membership clean than anything else.

I am on a committee now that is trying to adopt some plan that will be acceptable to the two associations and to the profession at large, and at the same time accomplish the work we ought to have. I am glad to hear this discussion. I have been satisfied for ten years that the meetings of our dental societies on August 1,—just when men are tired of work,—is the worst time. But what is the best time?

Every member of the American Dental Association will receive a copy of a proposed by-law, the object of which is to forestall as much discussion as possible. I hope those who are coming will come with the spirit of conciliation. If a rule does not suit you and suits the majority, make up your mind that you are wrong. If the rules do not work well we can change them. When a man comes up and says he wants something, if it is anything that can do no great damage, I always say, let him have it.

It is proposed to have about four sections of the country, that hold their meetings before or at different times from this national association. Get it into form, so when the national organization meets we have the doings of the profession in the United States condensed. Men will be clamoring to get those proceedings for ten dollars a year: I have tried for years to get a digest of the work the societies have done during the year. I hope the committee will get the criticisms and judgment and wishes of the profession in such shape that we will know how to organize it. If I could have my way, I would not have the election of officers at all. I would have a council to appoint the officers. The Illinois State Society has that plan, and it works very well.

Dr. B. Holly Smith. It is with a sense of gratitude that I find you have received my paper. As far as my friend Walker is con-

cerned, I want to put him right at once. He is in favor of a national organization. Important measures are being constantly brought to our attention. I was impressed with a feeling of solemnity when the statement was made that of the thirty men who organized this society eight only are still living. One of the important things is that the history of this society should be written. Men are passing away from us who know things that we would like to know, and that we would like our children to know. This matter cannot be effectively accomplished unless some such organization as Dr. Crouse mentioned is commenced. These things can be accomplished when we have one national organization, and, as Dr. Crouse says, it makes no difference how we get it. We satisfy the American Dental Association by letting them preside over one part of the country; let the Southern Dental Society preside over another, but they must hold allegiance to the national organization. I shall be proud and happy to be able to know that I have been as clean and honest as Dr. Crouse has been.

Dr. JAMES TRUMAN. I cannot agree with Dr. Crouse that the national organization should be a mere digester of other men's views, and that all the work should be done from below. My idea is that the national organization should be a thoroughly scientific body, and should be the leader of the subordinate forces. In regard to Dr. Ottolengui's views of the word "stomatological," I think he is entirely wrong. If I understand the meaning of the word, it is simply the science of the mouth. If dentists are not devoted to the science of the mouth, what are they devoted to?

To be continued.

HARVARD DENTAL ALUMNI ASSOCIATION.

THE Harvard Dental Alumni Association observed Monday, June 28, 1897, as "Alumni Day," which was unique in the history of the association.

In the morning, at the Harvard Dental School Building, clinics and demonstrations were given, and the work of the freshman, junior, and senior classes for the past year exhibited. A large number of cases of fractured jaws, with the patients present, and plaster casts, with appliances used, were shown; likewise in cleft palate and orthodontia.

In the surgical ward Professor Thomas Fillebrown successfully performed an operation in staphylorrhaphy for a child about six years of age. Dr. Dwight M. Clapp gave an exhibition with the X ray, showing its utility and practical value in dentistry, by means of a patient in the chair.

The afternoon was devoted to social entertainments. At 5 o'clock P.M. eighty-eight persons gathered at Young's Hotel, Boston, at the twenty-sixth annual banquet of the association. Reports of officers were submitted, showing the constant and yearly improvement in the condition of the association. The guest and orator of the evening was George Hodges, A.M., D.D., dean of the Episcopal Theological School, Cambridge, Mass.,

who spoke eloquently upon the events of the past six months. Professor Eugene N. Smith, dean of the Dental School, described the growth and success of the institution, and further stated that in eight years it had secured a fund of $48,000; that the number of students during the past year was one hundred and thirty-two, and that the incoming freshman class would number thirty men at least. The graduating class numbers thirty-two men, ten more than last year, which was the largest ever graduated. Charles W. Berry, '97, responded for the class.

The election of officers was held at the table during the progress of the dinner, and resulted as follows: Joseph T. Paul, D.M.D., Boston, class 1891, president; Frederick Bradley, D.M.D., Newport, R. I., class 1886, vice-president; Waldo E. Boardman, D.M.D., Boston, class 1886, secretary; Harry S. Parsons, M.D., D.M.D., Boston, class 1892, treasurer. Waldo E. Boardman, D.M.D., '86, William P. Cooke, D.M.D., '81, Frank T. Taylor, D.M.D., '90, all of Boston, Executive Committee. The officers of the association compose the council.

WALDO E. BOARDMAN, '86, *Secretary.*

TEXAS DENTAL ASSOCIATION.

THE Texas Dental Association convened in regular session at Waco, Texas, May 18 last, and elected the following officers: Dr. J. L. Buchanan, president; Dr. M. S. Merchant, first vice-president; Dr. J. W. David, second vice-president; Dr. J. G. Fife, secretary and treasurer. The meeting was of unusual interest, and the report of the secretary showed the association to be in a healthy growing condition.

J. G. FIFE, *Secretary,*
Dallas, Texas.

MARYLAND STATE DENTAL ASSOCIATION.

AT a regular meeting of the Maryland State Dental Association the following officers were elected for the year 1897-98: F. F. Drew, president; M. G. Sykes, first vice-president; E. E. Cruzen, second vice-president; W. W. Dunbracco, corresponding secretary; G. E. Hardy, M.D., recording secretary; S. C. Pennington, treasurer; W. A. Mills, Geo. R. Carter, W. W. Bruce, executive committee.

W. W. DUNBRACCO, *Cor. Sec.*

NEW JERSEY STATE DENTAL SOCIETY.

AT the twenty-seventh annual meeting of the New Jersey State Dental Society, held July 21, 22, and 23, 1897, at Atlantic City, N. J., the following were elected officers:

Dr. J. L. Crater, Orange, president; Dr. J. Allen Osmun, Newark, vice-president; Dr. Chas. A. Meeker, Newark, secretary; Dr. H. A. Hull, New Brunswick, treasurer. Dr. H. S. Sutphen, Newark; Dr. Oscar Adelberg, Elizabeth; Dr. F. E. Riley, Newark; Dr.

C. W. F. Holbrook, Newark, executive committee. Dr. W. E. Truex, Freehold; Dr. F. L. Hindle, New Brunswick; Dr. F. G. Gregory, Newark; Dr. Wm. L. Fish, Newark; Dr. Wm. H. Pruden, Paterson, membership committee.

National Association of Dental Examiners.

At the annual session of the National Association of Dental Examiners, held at Old Point Comfort, Va., July 30 to August 2, 1897, twenty-two states present, the following officers were elected for the new year:

C. G. Edwards, D.D.S., Louisville, Ky., president; G. L. Parmele, D.M.D., Hartford, Conn., vice-president; Charles A. Meeker, D.D.S., Newark, N. J., secretary and treasurer.

The president appointed as members of the committee on colleges: G. Carleton Brown, D.D.S. (Chairman), Elizabeth, N. J.; H. H. Johnson, D.D.S., Macon, Ga.; M. H. Chappell, D.D.S., Knightstown, Ind.; L. Ashley Faught, D.D.S., secretary by appointment of the committee, 1415 Walnut Street, Philadelphia, Pa.

Academy of Stomatology.

The following officers have been elected by the Academy of Stomatology for the ensuing year: Edwin T. Darby, president; M. H. Cryer, vice-president; H. E. Roberts, treasurer; I. N. Broomell, secretary; W. H. Trueman, librarian; H. H. Burchard, editor; D. N. McQuillen, member of council.

I. N. Broomell, *Secretary.*

North Dakota Board of Dental Examiners.

The North Dakota State Board of Dental Examiners held their last meeting on June 8 and 9, 1897, at Fargo, N. D. The officers elected for the ensuing year were,—R. B. Foster, of Grand Forks, president; H. L. Starling, of Fargo, secretary.

H. L. Starling, *Secretary.*

DENTAL COLLEGE COMMENCEMENTS.

Harvard University—Dental Department.

The commencement exercises of the Dental Department of Harvard University were held in conjunction with the other departments of the university in Sanders Theater, Cambridge, on Wednesday, June 30, at 10.30 o'clock A.M., President Eliot conferring the degree of Doctor of Dental Medicine on the following candidates:

Fred. W. Allen.
Frank P. Barnard.
Roy K. Belden.
Harry E. Belyea.
Charles W. Berry, B.S.
Ralph V. Blake, Ph.G.
Harold E. Davis.
Robert I. Davis.
Walter S. Davis.
John D. Dickinson.
Harold W. Estey.
Walter J. Faunce.
George L. Forrest.
Leo Green, A.B.
George T. Greenwood.
Francis H. Harding.
Edward E. Henry.
Arland M. Kenney.
Charles A. Lakin.
William Lunan, Jr.
R. E. McDonnough.
Thomas R. McMahon.
Joseph T. Mooney.
C. E. Parkhurst, A.B.
Harry C. Spencer.
Joseph H. Stromier, L.D.S., D.D.S.
David P. Thomas.
Clarence B. Vaughan.
Frank H. Veo.
George A. Warren.
Walter H. White.
Herbert C. Woodman.

DENTAL SOCIETY ANNOUNCEMENTS.

NORTHERN ILLINOIS DENTAL SOCIETY.

THE Northern Illinois Dental Society meets in annual session in Rockford, October 20 and 21, 1897. A good program is in course of preparation.

JAS. W. CORMANY, *Secretary*,
Mt. Carroll, Ill.

FIRST DISTRICT DENTAL SOCIETY OF ILLINOIS.

THE First District Dental Society of Illinois holds its fifteenth annual meeting at Streator, September 14, 15, 1897. Good clinics and essays will be on the program.

W. O. BUTLER, *Secretary*,
La Harpe, Ill.

EDITORIAL.

"LE ROI EST MORT. VIVE LE ROI!"

THE recent gathering at Old Point Comfort has proven to be in some respects the most important which has taken place in the history of American dental meetings.

The scientific factor was on the whole, and as compared with former meetings, of average or perhaps greater importance, measured by the results attained. But the work accomplished affecting dental organization and dental education in this country are the features which most prominently claimed attention, and for which the meeting will be most memorable.

The circumstances of the meeting were unique. At no time in the history of our calling has so noteworthy and important a gathering of American dental practitioners been held. They have met in greater numbers, but the objects which have heretofore drawn the profession together have been less important in character and diverse in kind. The two great society organizations, the American and Southern Dental Associations, the National Association of Dental Examiners representing the legislative, and the National Association of Dental Faculties the educational motive in dentistry, met with a common purpose,—

viz, unification and harmonization of their interests for the advancement of dentistry.

That there should be differences, even dissension, where such broad ground was to be covered, and where so many different opinions were to be reconciled, was necessary and unavoidable, but out of the multitude of counsels wisdom asserted herself and a spirit of tolerance prevailed, to the end that the sectional chasm which for years has divided our national professional interest has been at last bridged over, if not obliterated. The American Dental Association, with its long and honorable record of good work accomplished for the advancement of American dentistry, is numbered with the things that have been, and the future of our profession is to find its national outlook and the embodiment of its new hopes in an organization which is to be truly national in character. As President Truman, in his able address, has truly said, "We have come to the parting of the ways," we have reached a point where, while we look back with sadness upon the death of the old, we reach forward with hopefulness to the birth of this new National Dental Association which has sprung into being not by accident, but at the behest of those who are animated by lofty purpose and that love of their chosen calling which knows no geographical or sectarian limits.

The unification of our national dental interest is now an accomplished fact; but while we rejoice over it and congratulate ourselves that such an advance step has been made, let it not be forgotten that much is yet to be done in order that our new infant shall not die from neglect or suffer for lack of sufficient nourishment. The leaders of dental progress have sounded the warning. Not only have they called for aid, but they have shown by long arrays of facts and figures that our larger representative societies do not receive the support they need in order to force them up and maintain them at the plane of their highest usefulness. Recently published data, as well as the opinions of those most competent to judge, force the conviction that but a very small proportion of the American dental profession give adherence or encouragement to society work. This is not as it should be. The progressive practitioner can no more do without the benefits accruing from dental society work than the society can exist without his encouraging support. The necessity is a mutual one, and as one thrives so does the other. Membership in dental societies has been classed as a professional duty; it is more than that, it is a professional privilege, and for both reasons or either alone no dentist should neglect his society interest. It is only a widespread acceptance of that belief

which can insure to our National Association the support necessary for its continued existence. Let every member of our profession realize that the obligation in this regard is a personal one, and the success of the new organization will be assured for all time.

The work toward unification of interest manifested between the larger organizations had its reflection in the deliberations of the Faculties and Examiners Associations. In the latter, despite the dogmatic and partisan effervescence of a few, the discussions were characterized and happily dominated by a spirit of conservatism and harmony which is a credit and an honor to that body. Whatever exception may be taken to the methods by which some of its members have sought to enforce their views,—and such are but a small minority,—the results finally achieved should be cordially accepted by the whole profession as a step in advance.

Two important results achieved by the Examiners are especially worthy of notice,—viz, a revision of the Requirements for Obtaining Recognition, which is now more nearly in line with their right and power to enforce, and the promulgation of a minimum standard of preliminary educational requirement, which, as we interpret it, is technically in advance of the standard prescribed by the Faculties for the same purpose. If such be the case, it is highly regrettable that such a difference was not harmonized, and still more regrettable that the reasonable and progressive scheme formulated by the Examiners for securing a proper matriculate standard for the schools in the near future was not approved and adopted by the Faculties. Whether or not the action of the Examiners in this regard may be looked upon by the Faculties as outside their sphere, is quite apart from the fact that the plan proposed is an admirable one, and under the circumstances the least that should have been adopted by the Faculties. As the matter now stands on the question of a standard of preliminary requirement, the Faculties Association has retrograded, or at least has made no advance, which in this age amounts to the same thing.

The record of the last meeting of the National Association of Dental Examiners gives much promise of a realization on the part of that body as to just where their strength as a coercive factor in our dental educational system lies. We have taken exception to some of the acts of that body for the reason that in our judgment they indicated a tendency to usurp authority to which they were as an official body not entitled. On the other hand, we clearly recognize that through the powers vested in dental examining boards throughout the states the National Association has it within its power to exercise a positive influence for good in dental

education by preventing the licensing of incompetent men as practitioners of dentistry. While the exercise of that power is hedged about and conditioned by the diversity at present existing among the dental laws of the several states, the prime fact remains that the examining boards are the keepers of the portals of entry into dental professional life. With the work and methods of the colleges they have nothing to do, nor can they trench upon that territory without weakening their legitimate influence for good. The proceedings of their last meeting indicate that the more judicial members have grasped that fact, and it is cause for congratulation that out of the chaotic mass of conflicting opinions heretofore manifested in this branch of dental interest, the essential factor upon which all of their coercive power for good rests is being realized, and we trust will be utilized. We would further commend the tendency toward the formation of a committee of conference between the Examiners and Faculties Associations. As the index of a higher civilization is the spirit of arbitration, so is the tendency to adjust differences of opinion between these two bodies evidence of a healthy tendency toward mutual reasonableness in carrying out the important work in which they are jointly concerned.

When the record is complete, and the history of the Old Point Comfort meeting is written, we believe that the greatest good which its pages will show will be the decided progress made toward harmony and united effort in the uplifting of our profession.

More than Fifty Years in Service.

There were present at the meetings at Old Point Comfort, last month, seven dentists who have been in active practice for fifty years or more.

Dr. John B. Rich, of Washington, D. C., entered upon practice March 20, 1836.

Dr. Corydon Palmer, of Warren, Ohio, began in 1839.

Drs. W. W. H. Thackston, of Farmville, Va., Jonathan Taft, of Cincinnati, Ohio, and R. Finley Hunt, of Washington, D. C., began in 1842.

Dr. Jesse C. Green, of West Chester, Pa., began in 1843.

Dr. Henry J. McKellops, of St. Louis, Mo., began in 1844.

Dr. Rich is, we believe, with one exception, the oldest practitioner of dentistry, in length of service, in America; and Dr. Thackston is the dean of the holders of the degree D.D.S.

Well may these fathers of dentistry feel proud of the achievements of the profession they helped to nurture in its infancy; and

well may the dental profession feel proud to honor them. The DENTAL COSMOS greets them respectfully, with head bared, and cordially wishes them the full measure of their hopes and aspirations.

CORRECTION.

DR. H. W. GILLETT has called our attention to two misprints in his paper on Cataphoresis, published in the August number of the DENTAL COSMOS. On page 608, line 3, "fitted cotton material" should read "felted cotton material;" and on page 613, line 28 from top, "indirectional current" should read "unindirectional current."

HINTS, QUERIES, AND COMMENTS.

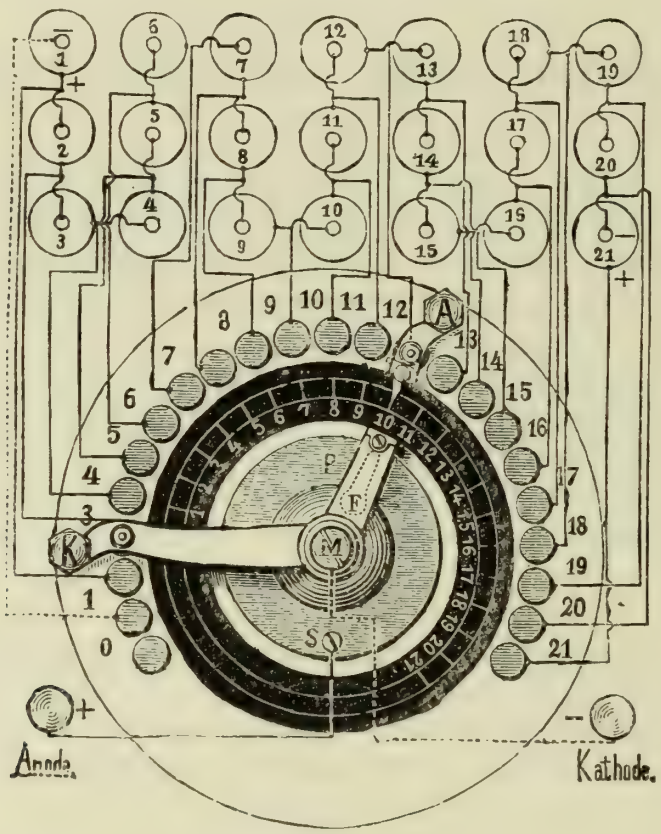
TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In my younger days as a dentist many of the articles in your journal that I read with pleasure and profit failed to help me as much as they might, either because of their abstruse character or because the appliances and materials required to secure certain results were unobtainable, for one reason or other, by me.

As one who has used cataphoresis for fourteen months with almost unvarying success, let me tell the rank and file, so to speak, how to fit up and use a reliable, serviceable outfit. Get and set up in series of two or three twenty-four small glass wet, Leclanche cells. Connect to a volt selector in the manner shown in accompanying cut. It has two cranks, which are placed on the same axis, but are insulated from one another, and the zinc of the first cell is not connected with a terminal, but with an additional peg. One crank is connected with the positive and the other with the negative terminal. By means of these two cranks any batch of cells may be inserted, and thereby the whole battery can be used up evenly. An index fitted to one of the cranks points to a division, thus showing the number of cells in action. Finally, by means of the double collector, each single cell can easily be connected with a galvanometer and tested, so that damaged or exhausted cells may be found out without trouble. In this way the double collector is a great convenience in testing the battery, and no doubt it is the best current collector known up to now.

Attach negative wire to any convenient sized piece of metal, to be held in the patient's left hand, explaining to them that holding it firmly or loosely will very perceptibly increase or modify the power of the current. Carry the positive wire to a *good* rheostat. If the adjective is written in letters six feet high, so much the better for the success of the operation. By "good" I mean one which is positive, uniform, and reliable in its action, and capable of being so manipulated as to allow of the current to be increased almost imperceptibly, as this is the key to the situation. The one I use is Dr. Lewandowski's, of Vienna. This has a zig-zag graphite resistance about six feet long, if it were straightened out, and works by a geared thumb-screw and turns very slowly, so that it is almost impossible to give the patient a shock. A soft platinum wire, attached to the wire

leading from the rheostat to the patient, completes the outfit as far as treating cavities is concerned. For work on the jaws proper appliances can be procured, but what I have enumerated will answer for all ordinary work. Put on a rubber-dam wherever possible. Put in the cavity a pledget of cotton, moistened with ten, twenty, thirty, or forty per cent., or higher strength, solution of cocain, and start with the rheostat at zero, and, if with a very nervous patient, with only two or three cells in circuit. Turn the rheostat very slowly till you get sensation, not pain; wait five minutes; turn the rheostat back to zero; put in circuit about six cells and start again, proceeding slowly till you get sensation. If six cells do not give sensation to a degree, turn back to zero and put in the lot and go very slowly, till you do get the feeling of warmth or prickling; wait eight or ten minutes and go ahead with your burring; see that when once applied



to the cavity the wire is not allowed to move an atom while current is on. To take away the wire, turn the rheostat to zero always before removing it, and remember you are introducing from 1.49 to twenty to thirty times that amount of volts into a sensitive cavity, and act accordingly. For removing live pulps, re-apply when you have reached a point where pain is experienced, always starting with the rheostat at zero. The introducing of only two or three volts at first minimizes the chance of a shock, and while it does not produce sufficient anesthesia to allow of the tooth being cut, acts sufficiently to allow of a higher voltage being used without inflicting pain.

The elaborate calculations of the different resistance of higher or lower percentages of cocain solution make me very weary to read, as it has nothing to do with the case. Ten per cent. and three volts in one case produce the effect of fifty per cent. and twenty volts in another. The case lies in a nutshell. High enough voltage to overcome the resistance of the

human body, a rheostat capable of introducing the same very gradually, and without any sudden accession of current, and an application as powerful as can be borne by the patient, be the same more or less, and patiently waiting till the cocain has entered the tooth-tissue. Never increase the number of cells in circuit by moving the key or switch-board without turning the rheostat to zero and removing the wire first, as a very violent shock will often result. The repetition of certain details in this article is purposely made to impress the importance of certain steps being always taken to avoid unpleasant results to the patient and, indirectly, to the operator.

As to using a milliamperemeter, let me say I have the one made by Edelman, of Munich, and adjusted to register one ten-thousandth of an ampere, and I have repeatedly produced (apparently, at least) considerable pain in the tooth, especially in the case of highly nervous patients, with, be it noted, good results as to obtunding the dentin, without an appreciable deflection of the needle, and I feel sure that many others have had the same experience; so, at the expense of boring your readers with my reiteration, I maintain that the sensations of the patient are infinitely the best and safest guide.—CHARLES RATHBURN.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JULY, 1897.

July 6.—No. 585,845, to H. F. Jones. Dental engine hand-piece.
" " No. 586,023, to J. Fletcher. Appliance for use in soldering artificial teeth.
" *20.*—No. 586,727, to J. W. Hard. Dental instrument.
" *27.*—No. 587,058, to S. E. Knowles. Rubber-dam clamp.
" " No. 587,223, to S. D. McKelvey. Head-rest.
" " No. 587,224, to S. D. McKelvey. Head-rest pad.

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ORIGINAL COMMUNICATIONS.

THE FACIAL LINE AND ANGLES IN PROSTHETIC DENTISTRY.

[PAPER NO. 3.]

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(Read before the Southern Dental Association, August 3, 1897.)

THIS paper is designated as No. 3, being a continuation or further elucidation of the line of thought presented in a paper by the present writer, read before this association at its meeting in Atlanta, November, 1895 (published in the DENTAL COSMOS, January, 1896), and continued in a paper read before the Dental and Oral Section of the American Medical Association in May, 1896, of which an illustrated abstract appeared in the DENTAL COSMOS, July, 1896, the paper in full being published in the *Journal of the American Medical Association*, February 6, 1897.

The importance of the study of the teeth, in connection with the reproduction of the maxillary movements in mastication, is not, as a rule, sufficiently appreciated. Dr. I. N. Broomell, in an article on the value of the "Temperamental Indications in Prosthesis," published in the DENTAL COSMOS, January, 1897, says,—

"Each individual tooth in itself tells of the nature of the movements in the inferior maxilla during mastication, and these inherent movements, established in accordance with the formation of the natural teeth, should not be interfered with in prosthesis."

Before proceeding with my subject, I wish to point out and correct certain errors in otherwise very gratifying references to my work.

To thoroughly understand the subject it is important that a clear distinction be had in mind between the terms "occlusion" and "articulation"—not as they are defined in the dictionaries, however,

but which, until some better terms are suggested, must be used as differentiated by Dr. Bonwill, *occlusion* referring exclusively to the position of the teeth when the mouth is closed and the teeth brought together in normal contact: in the words of Dr. Bonwill—"Articulation is a word of action throughout, while occlusion answers to the mere act of closing the teeth and lips and keeping them closed; one is active, the other passive."

In *occlusion* the cusps of the teeth rest in the sulci of the opposing teeth; in *articulation* they strike cusp to cusp, or cutting edge to cutting edge. It is evident therefore that there is but *one* position of occlusion, while there are various positions in articulation.

With this distinction borne in mind it is clear that the misuse of these terms is liable to occasion gross errors in the statement of facts, one of which occurs in "Catching's Compendium for 1896," as follows:

Dr. H. H. Burchard, the very able editor of the recently added department of the "Compendium," entitled "Science in Dentistry," has kindly familiarized himself with my work, and demonstrated to his own satisfaction the correctness of my views, having had my physiological articulator in his possession for this purpose, testing its accuracy by the aid of casts of dentures mounted on the "bows" of the Bonwill anatomical articulator, which are interchangeable with my physiological articulator.

On page 376 of the "Compendium," paragraph 4, speaking of Dr. Bonwill's articulator, Dr. Burchard says, "Full dentures mounted in this articulator according to anatomical principles based upon its correctness, were found when placed in the mouth not to reproduce a correct anatomical occlusion; the difference being clearly traceable to the parallelism of the planes of articulation and occlusion."

Through carelessness in the use of the words "occlusion," and "articulation" this paragraph contains a statement exactly the reverse of the fact, for dentures which *occlude* properly in the Bonwill articulator, or in fact in any other *occluder* that I have ever seen, *will* (provided that a correct bite has been obtained) *occlude* when placed in the mouth, but there is no assurance that they will *articulate*; it is only by chance that they may happen to do so unless the angle of condyle-movement has been ascertained and reproduced.

(The word *articulation* in the last line but one of the paragraph quoted should read "condyle-movement," as will be explained later in this paper.)

If plaster casts of normal human dentures be placed in the Bonwill articulator it will be found that though they will occlude properly they, as a general thing, will not articulate; that is, when the lower jaw of the articulator is made to functionate, no provision being made in the articulator for reproducing the normal drop of the ramus, the incisors in the position for biting will not meet, being held apart by the contact of the cusps of the molars; neither can the molars be brought into proper contact as for grinding food, the cusps of the molars on the functioning side being held apart by the

contact of the superior lingual and the inferior buccal cusps of the opposite side.

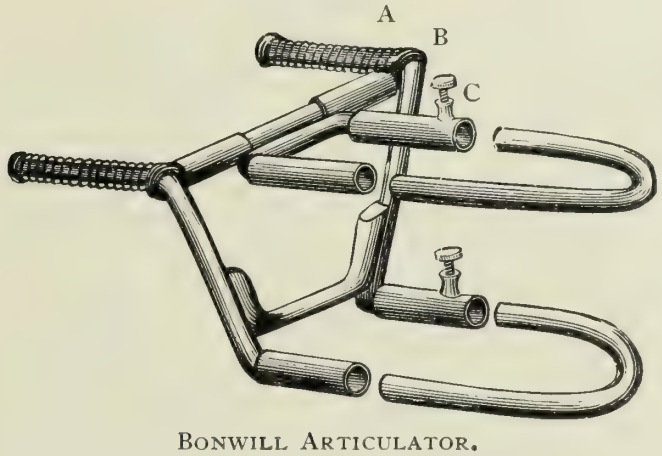
Of my physiological articulator Dr. Burchard says, "The proof of its mechanical correctness may be seen by placing in it casts of a natural denture."

In the Bonwill articulator (Fig. 1) the plane of occlusion is parallel with the plane of condyle-movement, the condyle-bar (A) which controls the function of the condyle being set at a right angle (B) to the ramus part (C).

Consequently the Bonwill articulator can reproduce only a condyle-movement which is parallel with the plane of occlusion.

In the "American Text-Book of Prosthetic Dentistry," edited by Charles J. Essig, M.D., D.D.S., in an editorial note to Dr. Grant Molyneaux' chapter on "The Bite or Occlusion," page 376, the planes of the Bonwill articulator are spoken of as "parallel" in line 4, while in line 8 the governing parts are said to have an angle of about 10 to 15 degrees—a manifest contradiction. In all the Bon-

FIG. 1.



BONWILL ARTICULATOR.

will articulators that I have handled—and they have been many—I have found the condyle-bar (A, Fig. 1) to be at a right angle to the upright (C); in fact Dr. Bonwill himself says "it has never been changed in design since first invented in 1858."

I have studied the condyle-movement very closely, in a large number of subjects, and have devised an instrument for measuring and registering the direction of the movement—the condyle-path, as I have termed it—but I have never yet met with a case in which the movement of the condyle was parallel with the plane of occlusion, though I have seen one case in which the path traversed by one of the condyles varied but one degree from parallelism with the alveolar plane, the other condyle registering ten degrees variance. This, however, was in an edentulous person, the small angle being due to extreme absorption in the posterior portion of the mouth, the anterior teeth having been very recently extracted, producing an unusual condition.

The general average is about thirty-five degrees, the highest thus far recorded in my observations being forty-five degrees.

It is a rather curious fact that Fig. 431 (page 372) of the "American Text-Book of Prosthetic Dentistry" (Fig. 2), which is used by

Dr. Molyneaux to prove the correctness of Dr. Bonwill's system of articulation, is an exact reproduction (even to the typographical inaccuracy in the lack of parallelism of the three planes of the cusps, L R, O P, and S T) of an original illustration never in print, except in the DENTAL COSMOS of January, 1897, page 40; one which I designed to prove the *incorrectness* of that system. Fig. 3 is Dr. Bonwill's familiar illustration, to which reference was made by him in the words which Dr. Molyneaux quotes in reference to my illustration.

It will be observed that in Dr. Bonwill's illustration (Fig. 3), the buccal and lingual cusps of the upper molars J and M are of the same length, resting upon the plane L R, the cusps of the lower molars K and N being also of the same length and touching the same line L R.

FIG. 2.

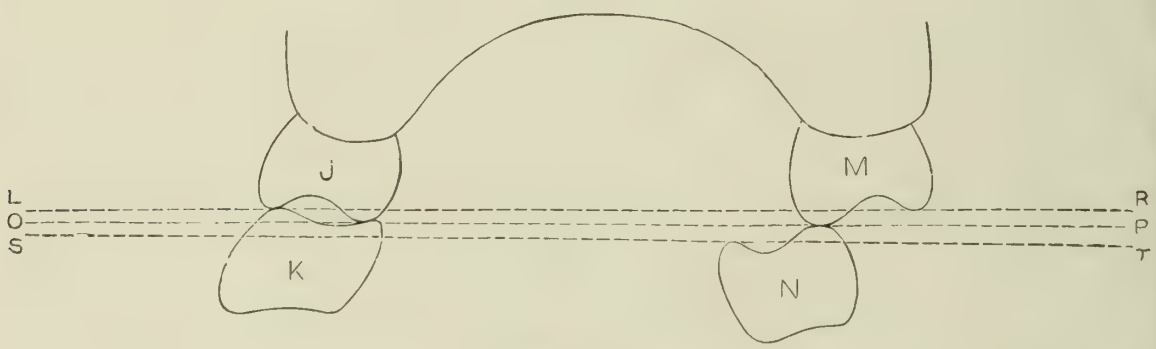
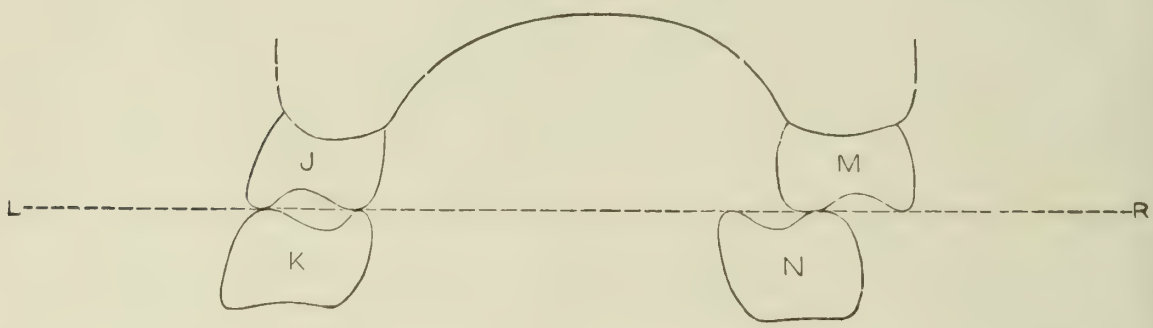


FIG. 3.



But if a denture articulated after this model be placed in the mouth, the drop of the ramus in the lateral movement of the jaw to the left will throw the teeth more or less exactly into the position shown in Fig. 4.

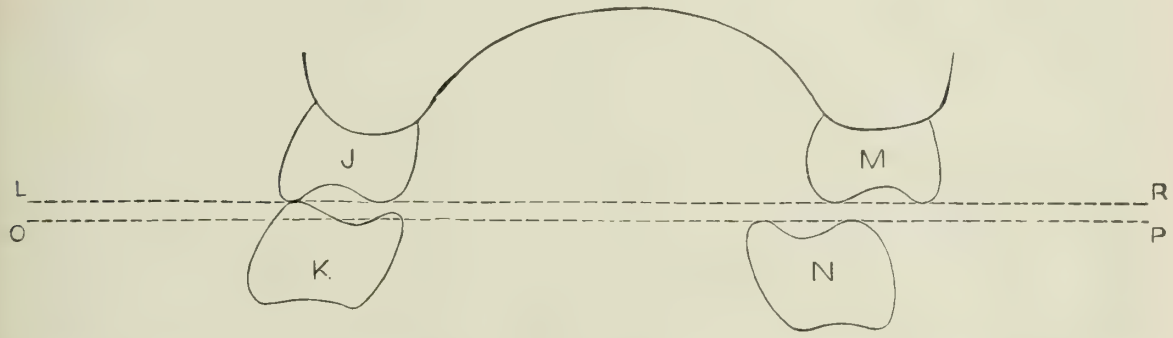
Teeth articulated by Dr. Bonwill's method—the "buccal cusps of the lower molars cut and rounded," etc., will have the appearance shown in his own illustration (Fig. 3), but never that shown in Fig. 2, which represents the molars with normal cusps as articulated in the mouth, and also in Walker's physiological articulator, with the mandible thrown to the right for mastication, the line L R the plane of the short buccal cusps of the upper molars J and M, being the same as in Figs. 3 and 4, the *normally* longer lingual cusps of the upper molars J and M being on the lower plane O P. With the same drop of the left side of the mandible, the denture is nevertheless balanced by the *long buccal cusp* of the lower molar N meeting the long lingual cusps of the upper molar M on the plane O P.

The masticating articulation on the right side is also perfect, the long lingual cusp of the upper molar J being met by the short lingual cusp of the lower molar K on the lower plane O P, while the long buccal cusp of the lower molar K meets the short buccal cusp of the upper molar J on the highest plane L R.

The comparative length or height of the cusps of the bicuspid and molar teeth can be beautifully studied by making casts of as nearly perfect dentures as you can find. Then, as I explained in my first paper, place the casts with the *cusps downward,* on a clear slab of glass, when after considering them as a whole, the different pairs can be studied more closely by bringing the pair under study to the edge of the glass, when the comparative height of the cusps can be clearly seen; the curve of the interdental line not permitting this to be seen so well when the entire cast is over the glass.

The difference in the planes occupied by the buccal and lingual cusps is greater in the mouth than would appear in looking at a tooth out of the mouth, held with its long axis vertical, as seen in many book ilustrations. As placed *in the bones* in the mouth the

FIG. 4.



lower molars lean lingually, and the upper molars lean buccally, which has the effect of increasing the distance between the planes occupied by the buccal and lingual cusps.

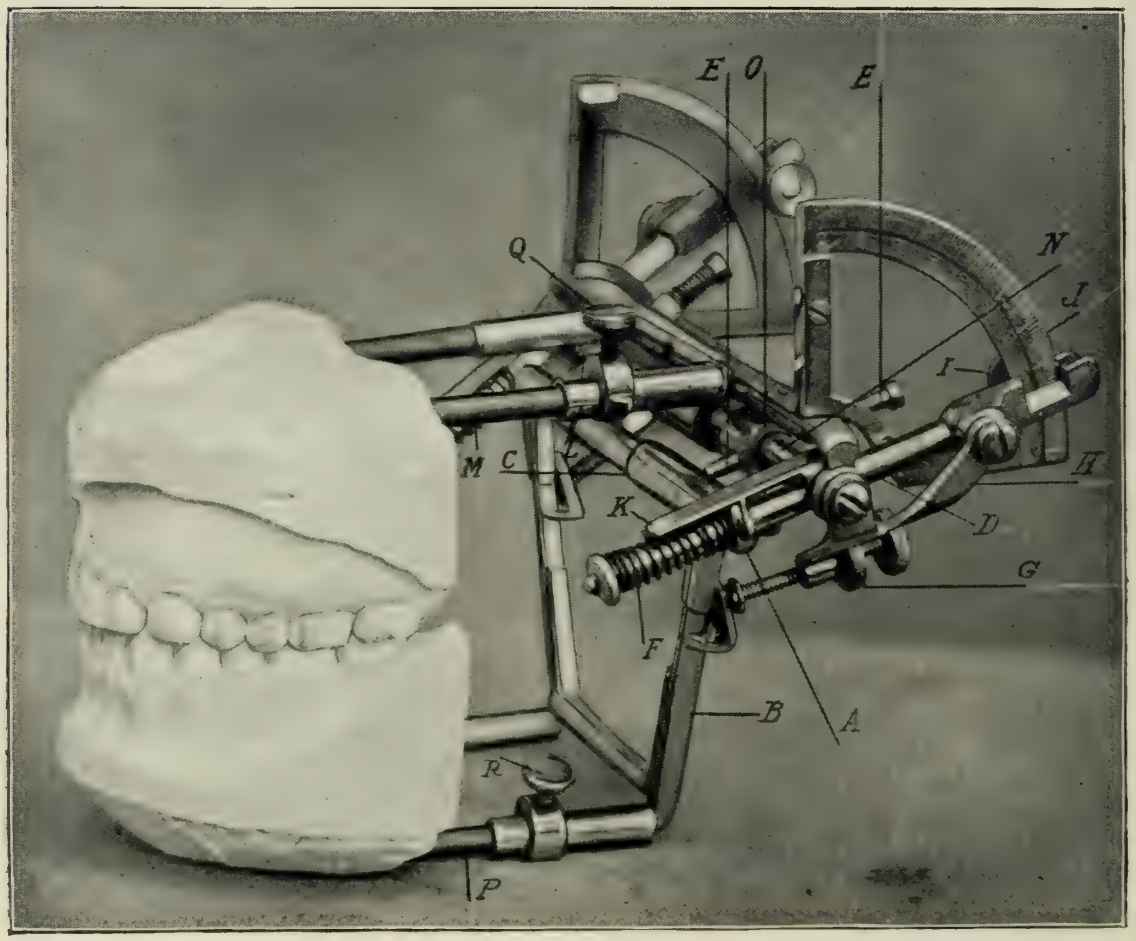
The prominence of the lingual over the buccal cusps in the upper teeth, and of the buccal over the lingual in the lower teeth, becomes greater as we proceed toward the ramus, partly due to an actual increase in difference, and partly to the gradually increasing variation of the long axis of the tooth from the vertical, as we proceed toward the ramus.

Dr. Bonwill's illustration (Fig. 3) (taken from a reprint of Dr. Bonwill's article in Harris's "Principles and Practice of Dental Surgery," twelfth edition), for which Dr. Molyneaux has substituted my Fig. 2 was also used by Dr. Bonwill as "Fig. 17," in the chart accompanying his Columbian Dental Congress paper, although it quite ignores the normal drop of the ramus in the functioning of the mandible, due to the *downward* as well as forward movement of the condyle in the lateral and the protrusive excursions of mastication, which, however, cannot be reproduced in the Bonwill articulator.

An articulator, to be reliable as a guide to the correct articulation of artificial teeth, must be capable of reproducing the articulation of casts of natural dentures, in all the different positions in

which the lower jaw can be placed for grinding food, biting, etc., as well as in simple occlusion; otherwise we could reproduce only the simple up and down movements of opening and closing the jaws, without the possibility of lateral movement except with teeth nearly or quite devoid of cusps. Fig. 5 shows the Walker Physiological Articulator, designed to fulfill the indications noted. A represents the mandibular condyle and is, in construction, a ring attached to the ramus B through the bar C and slides on the bar D, which controls the movement of A, and thus represents the condyle path. E E is a bite-correcting fulcrum-screw, against which

FIG. 5.

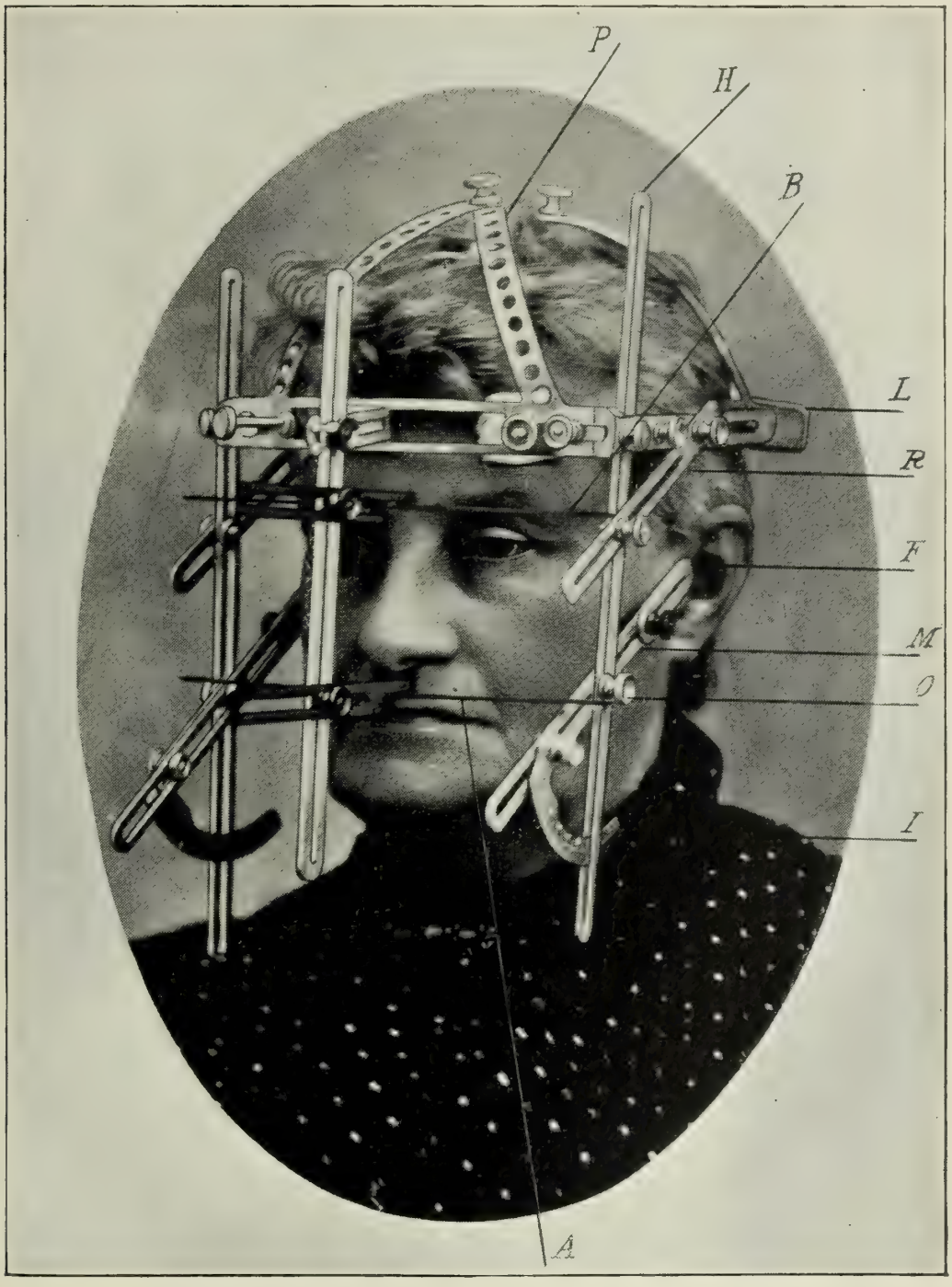


E is a bite-correcting fulcrum screw used to correct the bite when it is either too far forward, too far back, or falsely to one side or the other; *F* is another fulcrum screw which can be instantly removed with its supporting frame *G*, as it is only used in correcting a bite which is too close or not close enough; *H* is divided in its center so that the condylo-occlusal angle of one side may be adjusted independently of the other; *G* is an adjustable sliding collar which carries the bite-correcting fulcrum screw *F*, which passes through a slot in *E*, so that it is always parallel with the bar *H*, which controls the condyle-movement.

the bar C rests, being pressed against it through the action of the spring F on A. The distance that A is moved by E is shown on the millimeter gauge K. G is another adjustable fulcrum-screw which plays against the back of the ramus B, and is easily removed with its supporting frame H, being required only in correcting a bite which is too open or too close. It causes the condyle to move forward and downward when the jaws are separated, which is of no moment in the construction of a denture unless the bite has to

be changed. The bar N is divided at the median line, so that the condylo-occlusal angle of each side may be adjusted independently, as they often vary. An adjustable sliding-collar O carries the bite-correcting fulcrum-screw E, which passes through a slot in N. The bows P and L carrying the casts are secured by set-screws Q and R, and are in all cases to be pressed in as far as pos-

Fig. 6.



sible, and should never be moved to correct the occlusion. I is a clamping screw which binds D to the degree-gauge J, D being adjusted at the condylo-occlusal angle of the patient (or the condylo-alveolar angle in an edentulous case), the angle having been ascertained by the use of the facial clinometer as will be described later in this paper, and demonstrated in the clinics. The figure on the

degree-gauge J, where it is crossed by the bar D, represents the angle formed by D and L when projected to the point of intersection. The casts are to be so mounted on the loops that the plane of occlusion (alveolar plane) shall be parallel with P and M.

In the short movements of mastication, the condyle on the side toward which the jaw is advancing, travels forward and downward, on a line which being extended till it intersects the facial line forms at the point of intersection an angle which varies with and bears a definite relation to the morphology of the morsal surfaces of the teeth.

As this angle varies very considerably, not only in different individuals but also very frequently in the two condyles of the individual, it is desirable and important—*first,* to be able to determine accurately the direction of the movement of the condyle,—the condyle path as I have termed it—compared with the facial line and the plane of occlusion in the functioning of the mandible, and—*second,* to be able to exactly reproduce the movements of the jaw in an articulator carrying the substitutes for lost dentures.

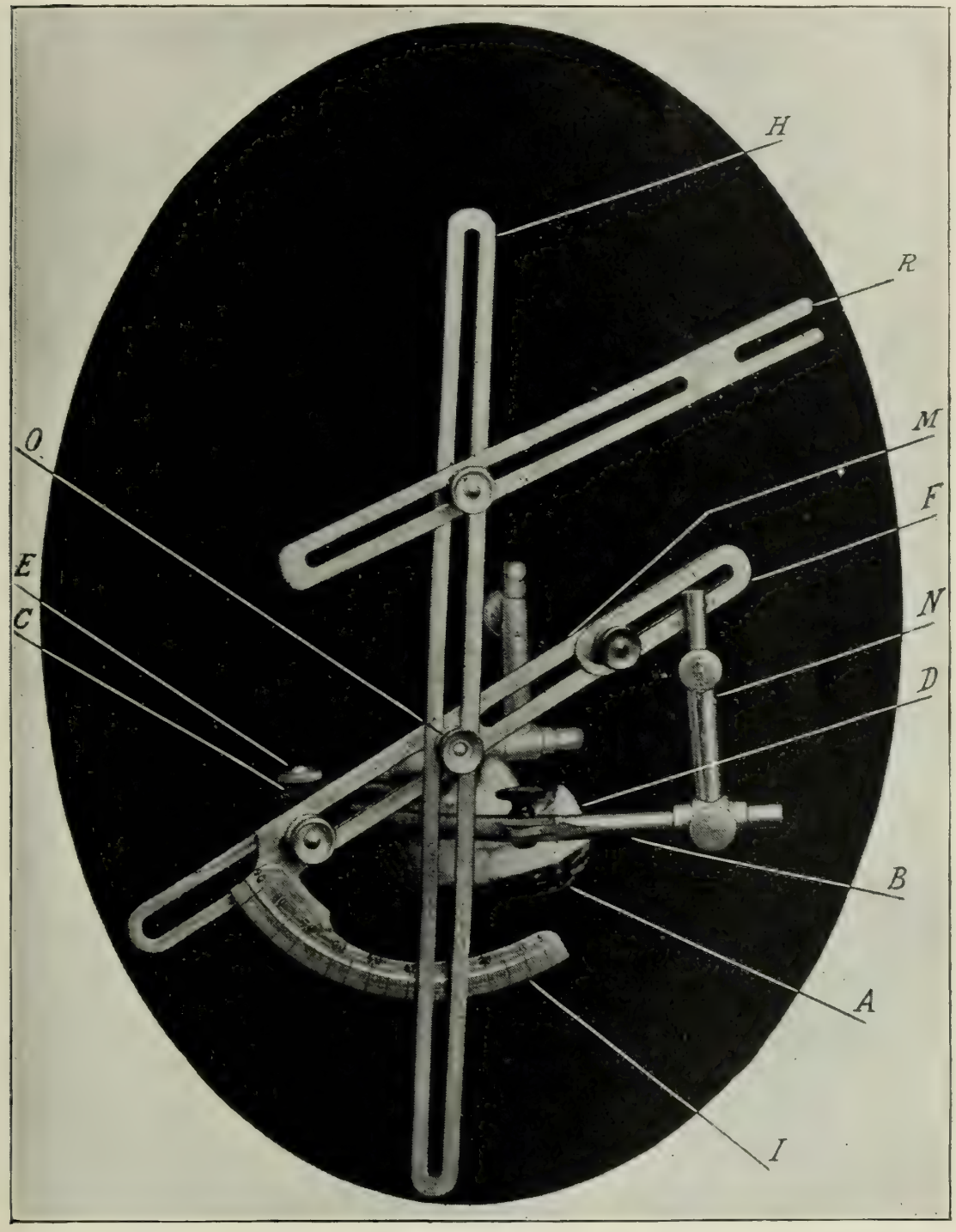
The path traversed by the condyle, extended till it intersects the facial line, forms at the intersection of these lines what I have termed the condylo-facial angle. The difference between this angle and that formed by the alveolar plane and the facial line, is the condylo-alveolar angle, to which I set the adjustable angle of my physiological articulator, in order to reproduce the exact movements of the jaw of the subject whose measurements have been taken.

The importance of the study of these facial lines and angles is pointed out by Dr. Broomell in the article before referred to with special reference to ascertaining the tooth-line level.

To measure the condyle-movement and these various lines and angles, I have devised an instrument which I have called the Facial Clinometer (Fig. 6). This appliance (which I will demonstrate in the clinic room) is made in two separate pieces and a number of small adjuncts. The adjustable jaw-piece B, Fig. 7, which is made of aluminum, is to be secured to the lower jaw and moves with it. When the lower anterior teeth are present, the piece is secured to these teeth. In edentulous cases, a lower impression is taken and a base-plate made (by the method of Dr. T. C. West, of Natchez, Miss.), as follows: Having obtained an accurate cast showing the seat of the lower artificial denture, coat the cast with rubber cement, and press in with the fingers only a sheet of black vulcanizable rubber, which will adhere to the cast because of the cement. Vulcanize, but only about three-fourths of the time required for a finished piece. This base-plate (Fig. 7, A) is trimmed to accommodate the muscles, and then secured to a lower impression tray (C) by means of plaster of Paris (D). When the plaster has hardened the jaw-piece of the clinometer is secured to the handle of the impression tray by the set-screw E, and the base-plate placed in the mouth, serving as a support to the jaw-piece of the clinometer. The condyle of the patient is located by pressing with the ball of the thumb in front of the ear of the patient, during move-

ments of the jaw in slowly opening and closing the mouth, its position when at rest being indicated upon the skin with a slight ink or pencil mark, or a bit of court plaster may be used if preferred. In a very thin person the movement of the condyle may sometimes be seen quite distinctly.

FIG. 7.

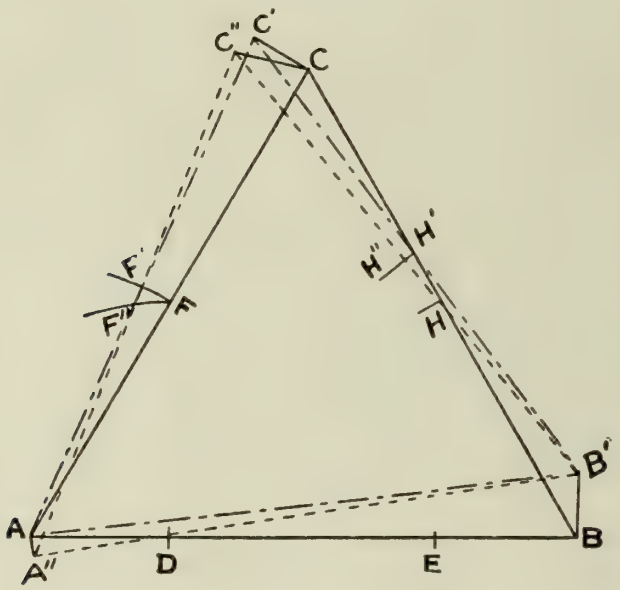


A projection at the upper end of the adjustable upright N (Fig. 7) of the jaw-piece is placed exactly over the condyle as located. The head-piece (Fig. 6) being also in position the projection of N (Fig. 7) plays in the slot of the transverse-bar M (Figs. 6 and 7), which is loosely pivoted to the upright H at O, the direction of M, which moves freely on the pivot-screw O, being determined by the movements of the jaw to which N as part of B (Fig. 7) is secured.

When by repeated opening and closing (the projection from N sliding easily in the slot of M without changing its position as the mouth is opened and closed), the set-screw O is tightened, the angle made by the condyle path (represented by M) with the facial line (represented by H) being registered on the degree-gauge I in the slot of the upright H. This is the condylo-facial angle. The millimeter gauges serve to measure simultaneously the distance traversed by the condyles in the excursions of the mandible, one moving forward, the other usually receding a little, sometimes not perceptibly, but in some cases a distance one-third that advanced by the other. I quote from my second paper:

"The ratio between the forward movement of one condyle and the synchronous backward movement of the other varies greatly in different individuals, and even in the same individual the ratio often varies in the left lateral movement as compared with the right.

FIG. 8.



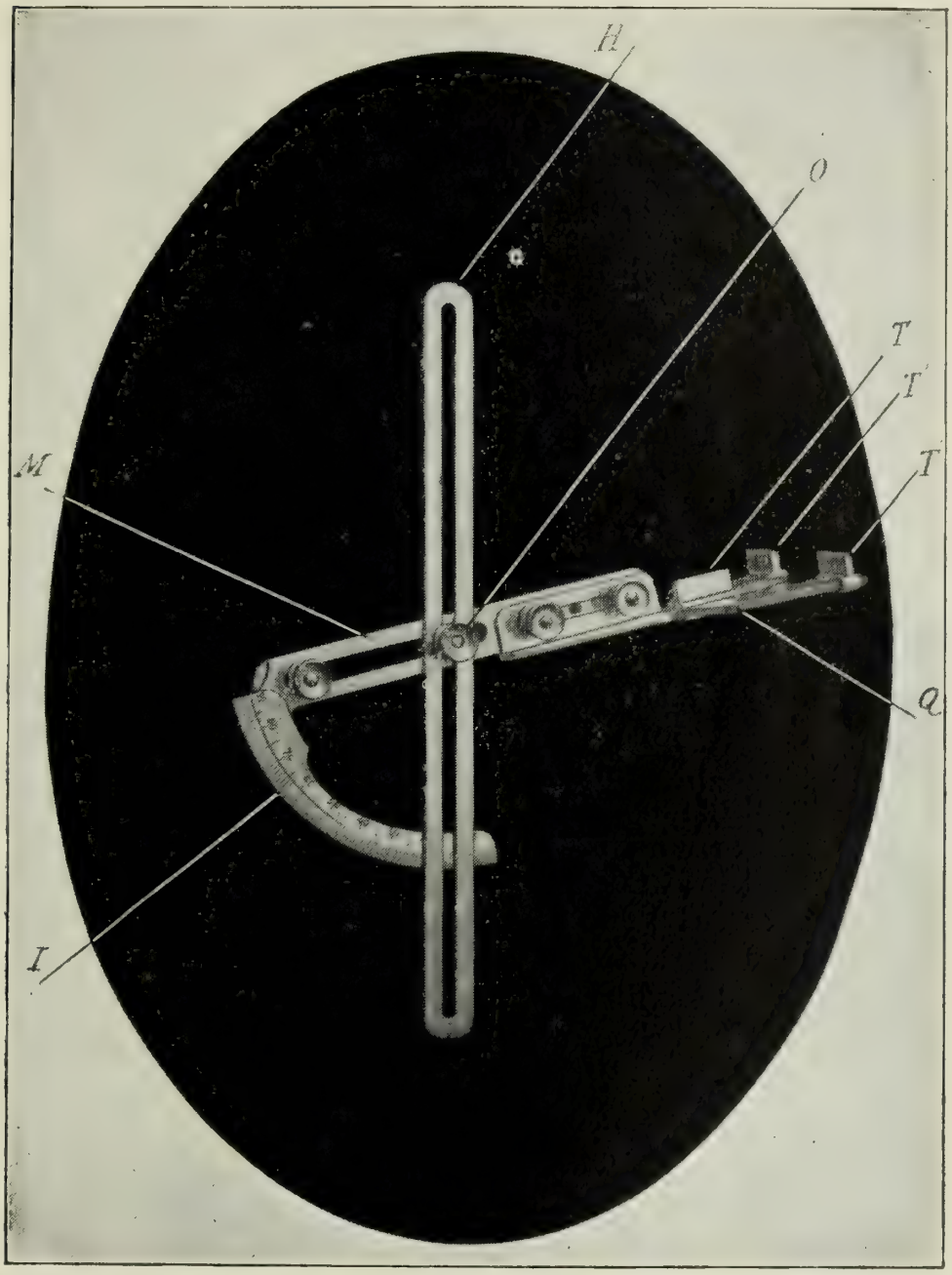
This distance measurement is registered in millimeters by the clinometer, and recorded on the articulator, where it serves to correspondingly regulate the distance at which to place the bite correcting fulcrum-screws from the condyles of the articulator. The importance of being able to recognize the extent to which, in any given case, one condyle recedes as the other advances, and of being enabled to utilize the observation, is illustrated by the diagram Fig. 8.

"The mandible, as we know, is based on the equilateral triangle, the sides measuring four inches. In the diagram A and B represent the condyles, C the point between the central incisors. If we imagine that the mandible is thrown to the left, and that the left condyle A does not recede, B, the condyle of the left side, takes the position B′, while C, the median line of the incisors, travels to C′. In the molar region F travels to F′ on the left, and H to H′ on the right. But in a case in which the right condyle B advances the same distance as before, while the left condyle A recedes one-third of that distance, moving to A″, we will find that the entire triangle

acts as though turning on the fulcrum D. C, instead of moving to C′, will reach C″, while F will have moved to F″, and H to H″.

"In constructing a set of teeth for a subject in whom, by reason of the condyle receding on the guiding side, the fulcrum is at D as shown, instead of at A, if by reason of the construction of the articulator the fulcrum is immovably fixed at A, instead of being

FIG. 9.



movable to suit the case, we should find the articulation at fault to the extent of the difference between the points F′ and F″, H′ and H″, C′ and C″, respectively, causing inevitable interference of the cusps, necessitating either the sacrifice of the cusps or the reconstruction of the set."

By comparing Figs. 6 and 7 it will be recognized that H, O, I, M, and R are in both figures, H and M of Fig. 6 being enlarged in Fig. 7, and showing the relation between the jaw-piece and the

head-piece. H is supported by the adjustable head-band L (Fig. 6) which surrounds the head and rests upon it as seen at P. H having been adjusted parallel with the facial line is held rigidly by the set-screws of the brace-bar R. To adjust H parallel with the facial line, projections from the center of the cross-bars A and B (Fig. 6) are placed respectively against the upper lip close under the nose, and the brow between the eyebrows, the bars being thus transversely at right angles to the facial line. The upright H is placed in contact with the ends of A and B, so that it in turn becomes parallel with the facial line, which it serves to represent, the angle made by the transverse-bar M, in the position to which it is guided by the movements of the jaw through the upright N of the jaw-piece (Fig. 7) being found recorded on the degree-gauge in the slot H as before described. Having thus found the condylo-facial angle the jaw-piece is removed and the piece Q (Fig. 9) is secured to M (Figs. 6, 7, 9), and placed in the mouth with the parts T, T′, T″ touching the upper alveolar process. M playing on the pivot-screw O in the upright H (Figs. 6, 7, 9), H being parallel with the facial line as before, in the center of the slot in H on the degree-gauge I will be found registered the alveolo-facial angle. The mathematical difference between the alveolo-facial angle and the condylo-occlusal angle, to which angle the degree-gauge J of this articulator (Fig. 5), is set, for each individual case, in order that the mandible or lower jaw of the articulator may functionate in exact reproduction of the movement of the mandible of the subject. The degree-gauges of the clinometer, by means of various appliances which will be shown in the clinic, register not only the angles of which I have spoken, but others, such as the mandibulo-facial, the classic-facial, the articulo-facial, the alveolo-facial, the occluso-facial, the dento-facial, and other angles, all of which are of scientific interest and all of value to the dental and oral prosthetist who desires to secure that scientific accuracy essential to perfection in the practical value of, and comfort to the wearer of, dental prosthetic appliances, and which have a more or less direct bearing upon the perfection of the results to be obtained through the use of the physiological articulator and the facial clinometer.

Relations of Chemistry to Dentistry.

BY DR. J. S. CASSIDY, COVINGTON, KY.

(Address before the American Dental Association, August 4, 1897.)

Mr. President and Gentlemen:

The subject allotted to me for this occasion is one which I approach with feelings somewhat akin to those of the timid youth who, for the first time, tells the story of his love, knowing full well that the loved one possesses many attributes of rare perfection, inherited from a long line of distinguished ancestors. The heroine of our story is dentistry, and I take it that her most illustrious progenitor is chemistry.

Investigation of the laws which were supposed to govern observed natural phenomena was one of the favorite pursuits of learned men from the earliest historic times. Reasoning from effect to cause as time progressed led to many useful discoveries, probably in the same ratio to intelligence and the laws of supply and demand as obtains in the affairs of this day and age.

The development of the ancient art of alchemy along practical lines was a leading civilizing influence on the people as they gradually emerged from their simple surroundings into a clearer perception of the comforts which can be obtained from changing material bodies into more desirable or needed conditions. The inhabitants of the deserts of Lybia were, in the olden time, inadequately supplied with common salt; their alchemists accordingly manufactured a substitute from camel's dung and named it Sal Ammoniac,—"Salt of Ammon,"—in honor of Jupiter Ammon, whom they worshipped. Herein the Arab chemists exhibited a commendable commercial spirit, whereas their Greek and Roman contemporaries labored somewhat more in the field of pharmacy, by extracting from both mineral and vegetable sources numerous medicinal agents, thus in their practice balancing the mercenary by the professional spirit.

Whatever of dentistry existed in those days must have partaken of the benefits derived from the important part played by alchemy in general therapeutics.

According to Dr. Ebers, many branches of science flourished wonderfully in ancient Egypt, and were practiced by specialists of the priestly order. "Our physicians," said the King Amasis to his visitor, Crœsus, "are only permitted to treat one part of the body. We have aurists, dentists, and oculists, surgeons for fractures of the bone, and others for internal diseases. By the ancient priestly law a dentist is not allowed to treat a deaf man, nor a surgeon for broken bones to treat a patient who is suffering from a disease of the bowels, even though he should have a first-rate knowledge of internal complaints. This law aims at securing a great deal of real and thorough knowledge,—an aim, indeed, pursued with a most praiseworthy earnestness in all branches of science." "I came to Egypt," wrote the Sybarite, "to consult a dentist. That rude fellow, Aristomachus, of Sparta, however, knocked out the defective tooth, and so saved me from an operation the thought of which had often made me tremble. On recovering consciousness I found that three teeth had been knocked into my mouth,—the diseased one and two others, which, though healthy, would probably at some future time have caused me pain."

During the long interregnum between the ancient Oriental and the modern European civilization there was such continuous robber warfare and rapine, that the arts of peace, outside of the quiet cloister, were not encouraged. There was no dental art worthy of the name, and comparatively little chemical research. In fact, modern chemistry, as a science, may be said to date its birth from the discovery of oxygen; and, coincidently, dental science must claim its origin as beginning about the same time. It would be

superfluous and beyond the scope of our present purpose to note the advances which these divisions of human effort have made since then. They are both concomitants of higher civilization. "Show me," said Tyndall, "the country where the greatest quantity of sulfuric acid is used and I will tell you that its people are, above all others, the most generally enlightened." In like manner we may say that the people of any community where dentistry flourishes are of a higher order of intelligence than are those found elsewhere. My own town, by the way, contains its full quota of excellent dentists.

Dentistry is and should be cosmopolitan. It appropriates with due permission facts and methods from the humblest as well as the most exalted occupations, and in return gives back to them a large per cent. of the benefits received. Metallurgy, molding, sculpture, surgery, medicine, physics, and chemistry have been appealed to not in vain, and as a consequence the accomplished dentist could point out to willing youth the best means of becoming experts in these separate vocations.

Of all these sciences that of chemistry is the most universal, since it has no limitations; all forms of matter and force must own its sway. In its domain secrecy, mystery, and charlatanism are no longer tolerated, and all who will may partake freely of the benefits it has conferred and will continue to confer in increasing ratio upon mankind.

To chemistry our profession is indebted in that it prepared N_2O, by which means, in after years, Dr. Horace Wells, a dentist, might be permitted to introduce anesthesia, the greatest boon ever conferred on suffering humanity.

And here let me say that it does not follow that a man must thoroughly understand every department of the noble science in order to appreciate truths in chemistry which may be daily useful to him in our profession. Even a limited knowledge of the principles of chemistry enables the operator to administer that anesthetic intelligently, knowing that N_2O supersedes the normal process of oxidation in the body and prevents the ready elimination of its products, inducing thus the anesthesia by rapid formation and retention of CO_2, which fact of itself suggests the proper remedies for overcoming the tendency to asphyxia which necessarily follows the inhaling of the gas.

Dentists, as a rule, are not indifferent to nor ignorant of chemical processes, nothwithstanding that our friend, Dr. Crouse, asserted that there was not a single dentist in this country who could make an accurate quantitative analysis of any dental amalgam; whereas hundreds might be named who could do so, if it were necessary. Indeed, there are many men, not professional chemists, who are able to do excellent work along the lines of chemical discovery and manipulation. The recent studies of the chemical and physical properties of amalgams are of inestimable value to every dentist who thankfully takes advantage of the information derived through the labors of Dr. Black.

Moreover, not to mention the innumerable pharmaceutical

preparations, our zinc oxid cements may be brought in evidence, and as some of us are sure that fillings of these materials are disposed to disintegrate more at the cervical portion than elsewhere, we also think we know the true and only cause of that unfortunate disposition, in that the part under or near the gum margin is a favorite point for alkaline fermentation, such as the production of ammonia, resulting in the inevitable abstraction by it of the electronegative substance of the cement. Some may be inclined to consider this brief allusion to cause and effect as "only a fine spun theory," but it is not; it is as susceptible of proof as any problem in mathematics.

We cannot, as dentists, escape, even if we so desire, the claims of the science of chemistry upon our earnest attention and study, for on every hand we are compelled to admit the insidious influence of its affinities to be the exciting and efficient cause of the principal diseases with which we have to contend. Happily the study of chemistry, while acquainting us with these potent influences, also points out to us within the sphere of the same science the means at hand to combat them most beneficently provided, if we will but study and apply them.

No member of this, as the late Dr. Atkinson termed it, "Excelsior Association of Dentists," will doubt the culminating discovery of Dr. Miller that at least lactic acid is developed in the mouth by the presence of bacteria, and the materials necessary to their support, and also to the play of chemical affinities at the point of carious destruction; and, further, that the destroying agent acts molecularly with as definite results as pertain to any other natural phenomenon. Some years ago, when the so-called "germ theory" of disease was introduced there were not a few who received the innovation with satisfaction, because they would not or could not understand, and therefore approve, the chemical theories of Watt. It is now, however, accepted beyond question that there is no conflict between the two theories; that bacteria are a necessary factor in fermentation, and that their only trysting-places are in the midst of extraneous material susceptible to that process, the elements of which must obey the laws of their affinities; and if, for instance, among other compounds, destructive and otherwise, lactic acid, as proven by Miller, is developed in contact with a tooth, destruction of that part will proceed molecule by molecule; so that, while it is probable that teeth, like other organs, yield to an increased nonresisting influence of a "periodic law," dental caries is *per se* a disease of purely chemical propagation. From this latter viewpoint the relations between chemistry and dentistry are not of the most amicable character, notwithstanding which the science whose unseen minions are directly responsible for the existence of our principal enemy will inevitably furnish us with more effective weapons of defense than we as yet possess.

No wonder that dentists are perhaps unconsciously more interested in chemistry than are the members of the mother profession; at least it would so appear by personal contact with them, and by impartial reading of medical and dental journals. One of the

former lately, to refer to a single example, expressed its surprise that any two acids could neutralize each other; and then went on to say that by mixing one part of acetic acid and one and one-half of carbolic acid a neutral compound will result. Any tyro in organic chemistry knows that phenol is not an acid, but on the contrary is an alcohol; and that an alcohol and an acid combined will produce an ester and water:

$$\underset{\text{Phenol.}}{C_6H_5HO} + \underset{\text{Acetic acid.}}{C_2H_4O_2} = \underset{\text{Phenyl acetate.}}{C_6H_5C_2H_3O_2} + H_2O$$

Perhaps the worst chemical blunder ever made, officially, in a dental journal occurred a few years ago in a foreign periodical, wherein the editor, with the characteristic stupid arrogance of *his* kind, criticising a brief scientific description of ordinary combustion, wherein light is an essential accompaniment, mentioned the rusting of iron as his *beau ideal* of that process. We could forgive him for this were it not that he presumed to "know it all" on all questions of a similar nature.

It goes without saying that a fore-knowledge of certain rules in chemistry is a great aid in adapting means to ends when anything new in that line appears; as, for instance, in cataphoresis, we were told at first that the positive pole must be used in contact with whatever drug was employed, whereas it is well-known in electrolysis that the radicals or ions of conducting compound liquids separate in a perfectly definite manner, the positive radical being attracted to the cathode, and the negative to the anode; so that we will likely obtain better results by selecting anophoresis when we wish greater penetration of a strongly electro-negative radical. A duly certified list of comparative positive and negative classes of radicals has been known for many years, of which we are welcome to take advantage; and in return for all these favors would it not be an act of courtesy on our part to approve, when occasion permits, certain changes in chemical nomenclature, adopted through official international committees appointed for the purpose by the most influential scientific bodies? Our journals, it is almost unnecessary to say, are editorially fully up to and are indeed in advance of the times; but we see too often in reports of discussion in our local societies, and in some of our latest text-books, names of things and terms that shock the sensibilities of euphony and truth. Take, for example, *potassium iodid;* is not that name more pleasant to the ear than iodide of potash,—especially when we realize that the compound contains no potash whatever?

We have been surfeited for a long time with cocain hydrochlorate, and lately with eucain hydrochlorate; although a generation ago it was decided that acids like hydrochloric (HCl), hydrobromic (HBr), etc., whose electro-negative radicals are elementary, confer names on salts which terminate in *ide* (the final "e" has been eliminated); therefore the name of every salt of such acids should end in "id," as, cocain hydrochlorid. It is only those acids which have compound negative radicals that give names to salts ending in "ate" or "ite," as the case may be. Sulfuric acid (H_2SO_4) forms

sulfates; sulfurous acid (H_2SO_3), sulfites; chloric acid ($HClO_3$), chlorates; chlorous acid ($HClO_2$), chlorites, etc.

Life is too short to nominate for consideration at this time more than just one other frequently misapplied word; and that word is "density." We use it—do we not—as a synonym for hardness in the structural substance of teeth, instead of in its true meaning, *i.e.*, specific gravity? Ice is harder and more compact to a cutting instrument than is liquid water; but it is less dense. The diamond, among the hardest of bodies known, is only three and a half times as heavy as water; while pure gold is comparatively soft, although more than nineteen times as heavy as the standard,—water. It is not possible to believe that the specific gravity of a tooth has anything to do with predisposition to disease, or even that compactness of calcium constituents is a condition that presents a physiological barrier to decay. While perhaps these matters may appear of small practical importance, yet surely as we claim to be devoted disciples of pure science, we have no right to trifle with accepted nomenclature.

Pyorrhea Alveolaris in Mercurial and Lead Poisoning and Scurvy.

PAPER NO. 4.*

BY EUGENE S. TALBOT, M.D., D.D.S., CHICAGO, ILL.

(Read before the Section on Dental and Oral Surgery of the American Medical Association, June 1, 1897.)

In former papers I advocated the theory that pyorrhea resulted from simple inflammation of the gums which afterward became chronic, involving the pericemental membrane; that it was due to a local factor which would produce this inflammation; that the inflamed membranes became infected with pus germs, and as a result liquefaction and degeneration of tissue are produced with or without calcic deposits.

The present contribution is intended to show that the genesis and progress of the pathologic state of the membrane due to constitutional causes is precisely the same. The following cases are of interest from this standpoint:

Mr. A., forty-eight years of age, merchant, was suffering from dyspepsia; was poorly nourished and very weak. His physician placed him upon tonics and calomel. In less than two weeks he came to me with the mucous membrane and gums very much inflamed. The saliva flowed in large quantities; the teeth were loose; the gums swollen; pus oozed from the sockets; the breath had a strong metallic odor. I placed him on six pints of spring-

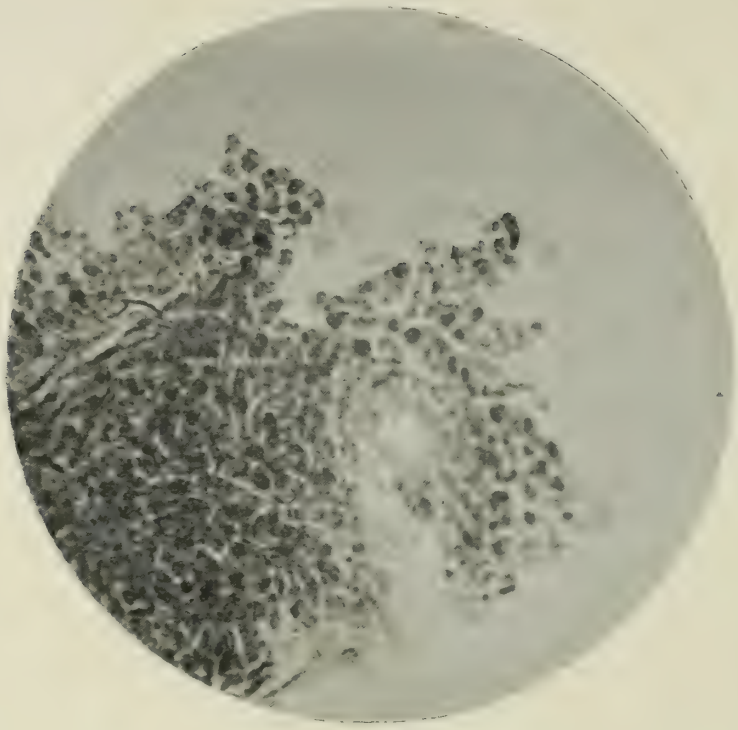
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* Paper No. 1, Dental Cosmos, 1886, page 689.

Paper No. 2, Dental Cosmos, 1896, p. 310; *International Dental Journal*, January, 1894.

Paper No. 3, Dental Cosmos, 1896; *Journal American Medical Association*, 1896.

FIG. 1.



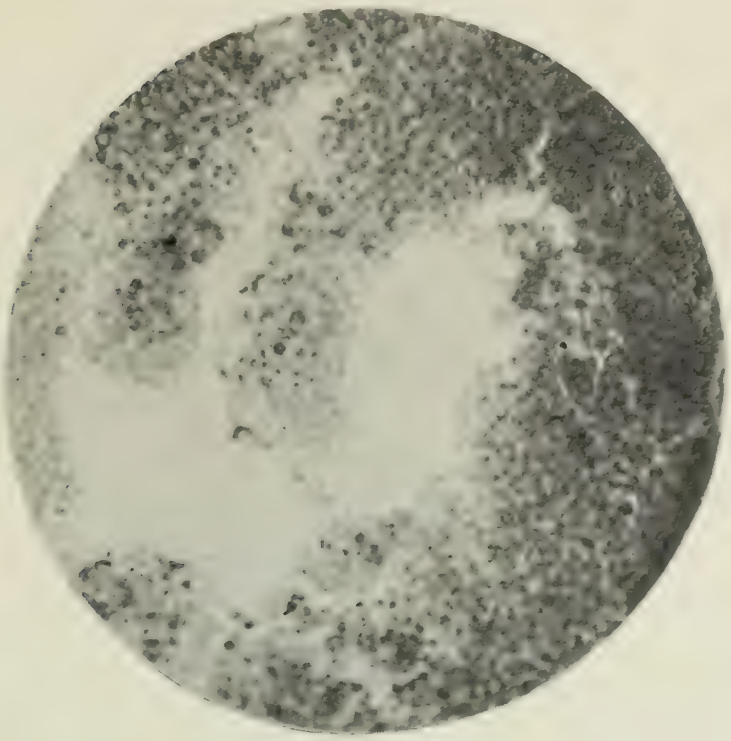
MERCURIAL POISONING.
Lower left second molar, pericemental membrane. Atheromatous degeneration.

FIG. 2.



MERCURIAL POISONING.
Lower left second molar, pericemental membrane. Atheromatous degeneration.

FIG. 3.



LEAD POISONING.
Upper left second bicuspid, pericemental membrane. Atheromatous degeneration.

FIG. 4.



LEAD POISONING.
Upper left second bicuspid, pericemental membrane. Atheromatous degeneration.

water a day, and saturated the gums well every other day with iodin. I requested his physician to stop the mercurial. In a few days I had reduced the soreness and swelling so that I could remove the deposits from the teeth. The lower right second molar was so loose that I removed it. He was discharged May 22, cured. On removal the tooth was placed in fifty per cent. alcohol for twenty-four hours, then absolute alcohol for twenty-four hours, in which condition it was given Dr. Vida A. Latham, of the Women's Medical School, Northwestern University, for preparation for microscopical examination. The membrane had receded about two-thirds of the length of the root, and these specimens were cut

FIG. 5.



SCURVY.

Upper left lateral incisor, high magnifying power. Inflammation of gums and pericemental membrane.

from the lower third of the root. Fig. 1 shows a small fragment of the inflamed pericemental membrane. Fig. 2 the round cells of inflammation, the atheromatous degeneration, and liquefaction of tissue.

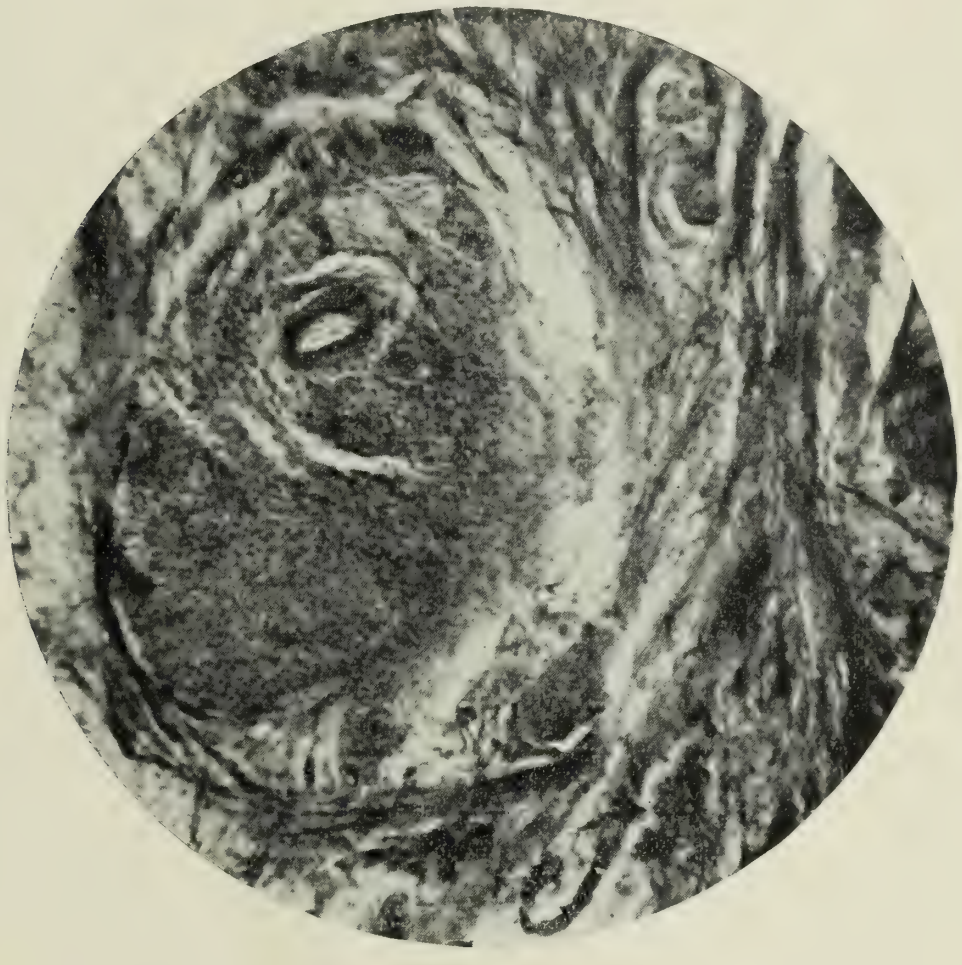
The microscopical examination was under the supervision of Prof. W. A. Evans, of the Columbus Medical Laboratory.

LEAD POISONING.

Mr. B., thirty-five years of age, painter by trade. He was under medical treatment for diabetes. The gums were badly swollen; there was excessive flow of saliva; the teeth were loose; pus

flowed from gums. I put him on two quarts ozonate spring-water per day and saturated the gums as before, with tincture of iodin. Three loose teeth were removed and placed in alcohol and prepared by Dr. Latham. These illustrations were taken from the upper third of the upper left second bicuspid, and are not unlike Fig. 1 and Fig. 2. Fig. 3 shows round cells of inflammation. Fig. 4 is the best specimen of degeneration of the pericemental membrane I have ever seen. The different stages of degeneration are well shown. In the corner is seen the root of the tooth, dentin, and cementum. The whole surface of the pericemental membrane is in a high state of inflammation. Just at the border of the

FIG. 6.



SCURVY.
Upper right second bicuspid, high magnifying power. Atheromatous degeneration.

root may be seen an area of membrane softening, and just beyond and joining is observed the breaking down of tissue. In the center are seen two areas of softened tissue more advanced in degeneration.

The following scorbutic case was referred to me by Dr. George W. Johnson, of the Cook County Hospital for the Insane: The patient, a twenty-five-year-old American, was admitted to the Cook County Insane Hospital December 2, 1892, suffering with melancholia attended by delusions of persecution and suicidal tendencies, marked by a refusal of food. June 1, 1896, he again began to refuse food, but took liquid diet on persuasion. June 29 the

patient was transferred to the hospital because of his emaciation. Scorbutic symptoms were discovered. On July 18, 1896, the constitutional and local symptoms of scurvy were well marked. The teeth were covered with sordes and loosened. Under antiscorbutic treatment these symptoms had fully disappeared by August 13, 1896.

Through the kindness of Dr. Johnson I was allowed to see this patient. I found none of the teeth very loose, showing that the disease was superficial. I removed two teeth that were decayed and most loose. These were prepared as before. Fig. 5 shows the gums and pericemental membrane in an active state of inflammation. Fig. 6 the root of the upper right second bicuspid, with pericemental membrane attached; shows active inflammation and an area of tissue degeneration. It will be seen therefore that in all three cases the same pathological changes occur in the gums and pericemental membrane, whether the original source of gum inflammation be local or constitutional.

The fact that it can be treated successfully locally, and that the calcic deposit is never observed in the substance of the pericemental membrane, but invariably outside, beyond the pus line, leads me to believe that it is not, *per se*, a constitutional disease, although the local inflammation may be due to constitutional causes; that there is no such thing as serumal deposits as suggested by Ingersoll, but that the deposits result from pathologic and chemical changes which take place in the tissues themselves, and are a consequence and not the cause. If the technique laid down in former papers be carried out, operators will be successful in treatment.

The Use of Screws.

BY H. W. ARTHUR, D.D.S., PITTSBURG, PA.

(Read before the Pennsylvania State Dental Society, at Glen Summit, July 6, 1897.)

Cohesive gold and the control of conditions afforded by the introduction of rubber-dam, made possible large restorations of broken-down tooth-structure.

The use of screws in dental operations was born of the necessity for greater security for retention in restoring and contouring, and it is to this class that the use of screws is specially applicable. While crowning has taken the place of building up in extreme cases of restoration, the usefulness of screws has not diminished, but has rather increased. By their use foundations may be made for crowns on roots that would otherwise be useless. By the use of small screws, in many cases, security of retention can be had where undercuts and grooves would endanger the pulp and throw the strain for retention on structure already greatly weakened.

In the minor cases of restoration or contouring where the small screws may be used, the screw does not seem to have had the recognition that it deserves. It may be claimed for it that (if

judiciously inserted in those parts of the teeth best able to bear the strain) it gives the maximum retention security with the minimum loss of tooth-structure.

The use of the screw, as has been intimated, is in those cases where extra retention security is wanted, and it does not supplant old methods of retention in ordinary cases, though in many it may supplement.

In this model we have assembled a number of typical cases where screws may be used; some where their use would be good practice, and others where their use would be more positively indicated.

Taking those where their use would be good practice, we would present first a central incisor with a large cavity on the distal surface; the incisal angle is weak. For filling the cavity as it is, the ordinary methods of retention would be indicated; but if we take into consideration that the incisal angle is liable to fracture, and there may be objections to anticipating this by cutting it away, the resort to the use of screws is certainly good practice, as it will not only afford security for retention as it is, but also in the event of fracture, in which case an additional screw near the incisal edge will give security for retention in restoring the incisal angle.

The upper first bicuspid is another case of this class. The tooth has a filling on the mesial surface extending across the occlusal, including the distal, surface. The disto-bucco-occlusal angle is contoured. A screw was placed at the disto-bucco-gingival angle. The lingual surface is broken off, leaving the filling exposed along the entire lingual side. We have here ample space and room for placing two screws, which will give retention security for restoring the lost part and will assist in retaining the first filling.

The lower first bicuspid, together with the second bicuspid and the first molar, shows another class of cases where the small screws may be used to advantage. It is noticeable that the occlusion on the first bicuspid distal surface is close, dipping into the cavity space. This might be filled successfully by undercutting, but with less loss of tooth-structure, with greater retention security, and with more ease by the use of a screw. The disto-occlusal angle is wanting, so that a screw can be readily placed pointing toward the mesio-lingual angle.

In the lower second bicuspid the mesio-buccal and lingual angles are broken down; the sulci have no faults; the bite is close; there is a broad seat for the filling at the gingival line. The opposite point of retention, by the ordinary methods, would be made by undercutting near the occlusal surface, or cutting through that surface into the sulci for anchorage. By the use of a screw anchored in the strong body of sound tooth-structure, as shown, near the occlusal surface, greater security for retention can be had with no weakening of the tooth-structure.

The lower first molar is somewhat similar; in this case the strain being greater, a larger screw may be used. Placing it in the body of the tooth, near the occlusal surface, a seat is made for a small screw near the mesio-bucco-gingival angle, and others might be placed. Still another in this class of cases where the small screw

may be used to advantage is shown by the tooth in the place of the upper second molar; the tooth is an upper third molar. It is in that tooth, in place, that screws may be used as here shown. The screws are placed through the cavity, near the disto-gingival line angle, in the dentin.

Where the breaking down of the angles necessitates a resort to contouring, the use of screws is more positively indicated. The point of opposition for wedging in these cases by the ordinary methods is wanting, unless resort is had to deep cutting, which will endanger the pulp, and even then will not afford the security for retention which can be had by the use of screws. We have here in the model several cases of that class.

There are other cases where the use of screws is positively indicated, where retention security cannot be had without them. The upper cuspid is an example of this class. It is worn down about one-half, is perfectly sound; the pulp-chamber is well protected by secondary dentin. In this case, without disturbing the tooth-structure other than for placing screws, perfect retention security can be had.

In many cases where access may be had to the pulp-canals, screws of the larger size may be used and supplemented by smaller ones. Where roots are badly broken down, so that the margins are wanting, the use of screws for securing a foundation of amalgam for crowning cannot be overestimated.

The location of screws is a matter of considerable importance. It should be at a point readily approached for inserting both the screw and the filling. It should be as far as possible from the pulp and not too near the margin of the tooth, and consequently at a point where there is the greatest bulk of tooth.

In the incisors and cuspids the point that meets these requirements best is the linguo-gingival angle, either mesial or distal. This point should be made accessible by free cutting if need be, as it will not weaken the tooth.

With caution screws may be placed at the labial angles. Usually it will require considerable space, but there should be no hesitation about making space, as a little more exposure of gold is a matter of small consequence compared with that of avoiding the pulp and margin and getting the screw fixed.

Where there is sufficient space a screw may be placed near the incisal edge in the dentin, otherwise there is a liability of encroaching on the enamel plates or the pulp by placing a screw at this point.

In the bicuspid and molars where there is sufficient space (and in many cases it would be good practice to make space), the best point is in the center of the body of the tooth, near the occlusal surface.

In many cases we have to be governed by the convenience of approach and the relation of the pulp in selecting the point for placing a screw.

Where the course of the pulp-canal is used for placing screws, the shape of the roots and their size should be considered, especially in the posterior teeth, where large screws are used.

For cavities in the upper molars, the lingual root is the best, as it is the largest and most readily approached.

For securing a foundation for crowning it is best to put in two screws. This can be done in bicuspids and in molars by using more than one root.

In regard to the use of screws in practice, many no doubt "lose the good they oft might win by failing to attempt," and others by failing in the attempt. It would seem to be a simple operation to place a screw, and yet to be successful, care must be taken in each detail, and always especially in placing the small screws.

To avoid confusion care should be taken in the selection of the size of the instruments and screws; and where these are not fixed in sets, they should be tested *always* before using. This confusion can in a great measure be avoided by confining ourselves to the use of two or three sizes of screws; in most cases two will do,—the small size anchor screw, one hundred threads to the inch, and a large size about forty-eight threads to the inch.

For the anchor screw there is a set of instruments complete that could not well be improved upon, though there may be a choice of these. When no drill is furnished with the tap and carrier it is well to test the drill as to size each time before using.

As to the manipulation in the use of the anchor screw, having decided where we will place our screw, we should make sure that the way is clear to direct approach to that point.

The first step in the manipulation is to countersink with a small round bur a seat for the filling at the point where the drilled hole is to be.

With a "limit drill" in the engine, carry the drill steadily up to the shoulder, and then withdraw quickly while it is revolving; if allowed to stop it may break off in the drill-hole when you attempt to remove it.

Take the tap, place it cautiously in the drilled hole, give one or two turns; when it is engaged let it be free, so that it may line up with the drilled hole, repeating this procedure with gentle pressure until the tap is arrested. It must be kept in mind that the instrument is a delicate one, and may break in the hole if rudely handled.

We prefer the screw-chuck as a carrier, because we can regulate the length of the screw and the screw is held firm, so that in placing it the thread on the wire or in the tooth is not liable to be torn. With the screw in the carrier the procedure should be the same as with the tap, leaving the instrument free after every few turns, that it may be in a line with the drilled and tapped hole. It should be tested by gentle turning to make sure that it is fixed. Then loosen the handle from the shaft first; unscrew the shaft from the anchor screw. A word of caution: the drill and tap being more slender than the chuck-screw carrier, it must be borne in mind when using the former that room must be left for the use of the latter, so that it may not come in contact with the tooth at any point other than the seat of the filling, when the screw is placed or being placed.

The placing of the larger screws in the pulp-canal, while not requiring the same delicacy of manipulation, requires care. Where

the roots can be approached directly but little difficulty will be experienced; where they must be approached at an angle, as in the case of the lower second molar in the model here shown, the main difficulty is in making the drill-hole in a line with the course of the canal. The right-angle attachments do not supply the need. An instrument such as we have here is one that can be depended upon; the reach is long enough, and yet not too long; the shifting angle is the main advantage to be had in its use.

The short finger chucks can be used for tapping and placing the screws.

The presentation of our subject,—the use of the screw for filling, and especially the use of the anchor screw,—is not complete without some reference to the manipulation about the screw in filling.

The object in making a seat for the filling, in which the screw is placed, is to give stability to the filling. And this is accomplished by condensing the gold around the base of the screw and following it up until the screw is covered. When we consider the limited amount of surface the screw presents, we can understand how necessary it is to condense the gold well to make it secure. For this reason we would advise the use of small pointed pluggers, straight and contra-curved.

Gold should be worked all around the screw from the first, and not wedged in on one side, leaving the other side unsupported.

Some object to the use of screws on account of the complications and care necessary in placing and filling, but this certainly has no weight compared with the security and results attained by their use.

CORRESPONDENCE.

"DENTISTRY PURE AND SIMPLE!"

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I should like to call attention to the proceedings of the last meeting of the British General Medical Council, held in London on the 29th of May last, published in July 1 number of the *British Journal of Dental Science*, and other journals in England. This powerful body have complete control over the colleges which grant "licenses" in dental surgery in this country, and approve of a certain curriculum which they expect to be carried out. They have no representative from the dental profession among them. Realizing no doubt their lack of knowledge as far as dental science is concerned, they were shrewd enough to appoint one of the most renowned men in dentistry in London (a gentleman of hereditary fame, I may add), Mr. Charles S. Tomes, as "Visitor Inspector," to inspect the different examining bodies, and to report on the workings of the same. Mr. Tomes sent in his report, a very long and no doubt creditable document, which was read, in part, before the meeting of the Council and discussed in a very remarkable way. In this report he showed that the examinations in dentistry as con-

ducted by the Royal College of Surgeons of England were all that could be desired; he however did not seem to favor some other licensing bodies quite so much; he did not quite agree with the Royal College of Surgeons of Ireland granting the examination, *sine curriculo,* to *registered* dentists in the manner in which they do at present; whether he be right or wrong on this particular is a matter of opinion. I think the college is quite right. After all this gentleman's trouble in getting up this lengthy report, in which in his endeavors, no doubt, to convince the Medical Council of the thoroughness of the course and the examinations given by the Royal College of Surgeons, England, he reports that "a fair sample of the questions asked" are such "as the treatment of parotid fistula, tongue-tie and its treatment, removal of the tongue, sebaceous cyst of the scalp, dermoid cyst, wounds of the radial artery, gummata, the stages of syphilis and the treatment of it."

Listen to the remarks this portion of the Visitor Inspector's report aroused! "Dr. Rentoul asked if it was a surgical qualification" that was required. "Mr. Thomson said it was a qualification for drawing teeth—dentistry pure and simple!" Then after questioning the chairman of the Dental Committee and representative of the English College of Surgeons as to *the use of such training* for dentists, he went on to say, "He did not quite see what connection there was between the scalp and the teeth, or syphilis in general and the teeth." Comment on my part is quite unnecessary; simply would I say, *Est modus in rebus.* Remarks of this kind *require* publicity. Has ever such ignorance been displayed by a governing body of educationists? How very far *drawing teeth* is from the science of dental surgery is never likely to be realized by Sir William Thomson and those who indorsed his sentiments, but such remarks will long remain, *valde deflendum,* a blot on the pages of the history of the growth of dentistry in England. It seems to me a pity that just now, when everybody interested in the advancement of the profession is doing all in his power to promote further its status, that this should have transpired. The Medical Council will never be fit to administer properly the regulations for dental educational matters, until it includes among its members representatives from the dental profession. I am, sir,

Yours truly,

AN ENGLISHMAN, D.D.S.

LONDON, August 11, 1897.

PROCEEDINGS OF SOCIETIES.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

(Concluded from page 776.)

Following is the discussion on the report of the Committee on Practice,* and on Dr. Gillett's paper on "Cataphoresis:"*

Dr. F. W. Low. Since so many points of the very excellent

*See DENTAL COSMOS, August, 1897, pages 605 and 636.

report of your Committee on Practice are in some measure discussed by the able handling of the subject of cataphoresis in general which we have just listened to, I find myself much in the position of the last speaker at the campaign club; and while it is not my privilege to discuss Dr. Gillett's essay, I may possibly be permitted to express my conviction of the truth of all his findings, and to state that so far as I have gone his deductions tally exactly with experiments which I have made. I was surprised to find from the report of the Committee on Practice how few are using the street current. There *is* a possibility of being struck by lightning, but it is very slight; and there is certainty of occasional discomfort to the patient, but not severe enough to prevent one from using such an instrument when the employment of battery circuit would occasion very considerable inconvenience. The hand of the patient is the most convenient place for the electrode not in use in the mouth or at the seat of operations. It is true that some shock might be caused by dropping it, but I never had such an occurrence happen in my practice. If Dr. Rhein uses eighty or one hundred and fifteen volts and interposes sufficient resistance, he will have flowing through the patient three-fifths of a milliampere, and will have decomposed 1-375 of a grain of cocain salts in ten minutes, having accomplished exactly the same result that another operator does with only six volts and no resistance interposed save only that of the patient. *It is current that does the work.* I am under great obligations to Mr. F. E. Averill, of Buffalo,—an electrical expert,—and to Dr. Carpenter, of the Health Department of Buffalo, who have enabled me to learn the rate at which cocain salts are decomposed. If all that is decomposed should be absorbed by the dentin, one could hardly expect toxic results. A jeweler's eye-glass shows that much of the alkaloid clusters about the electrode, however. I have had two experiences of leakage at the gum line, but neither was sufficient to cause alarm. Those machines which depend on cell selectors to temper voltage to the idiosyncrasy of each patient could be much simplified, since with four cells and a rheostat one can go through a certain scale of amperage, and starting over with full resistance again, but with all the cells in the battery thrown into circuit can obtain the same current now at starting that the procedure before concluded with. Since no more alkaloid is decomposed than the current strength calls for, it does no harm to have a strong solution. Weaker solutions, however, furnish ample cocain salts. But two conditions militate against cataphoresis; one is the idiosyncrasy that prevents cocain anesthesia; the other condition is hyperesthesia to the electric current, so marked as to prevent its use, however modified.

In this connection I desire to recommend the careful reading of the paper of Dr. Price, of Cleveland, published in the February number of the DENTAL COSMOS, especially that portion of it reporting a very interesting series of experiments to determine the relative amount of pain caused by various combinations of voltage and resistance. The various manufacturers of cataphoric appara-

tus, with one exception, all make claim that *their* apparatus causes *no pain*. This does not exactly tally with the experience of the majority of operators who use them. The initial shock of a well-proportioned rheostat is not at all severe, however, while, on the other hand, to make the operation entirely painless would require that the instrument be capable of making a great number of steps, thus delaying the operation considerably. I have completed cataphoresis in seven seconds, and usually do not exceed eight minutes, except where I anticipate extirpation of the pulp. I prefer not to induce such profound anesthesia as some operators do, since I desire to be warned if approaching dangerously near a living pulp. For bleaching with cataphoresis, I have experimented with pure water, salt water, electrozone, peroxid of sodium, chlorid of soda, chlorid of lime, pyrozone, three per cent., five per cent., and twenty-five per cent. In an imperfect way I went over many experiments that Dr. Gillett reported, and read a paper at Rochester last fall. I sent samples to the DENTAL COSMOS in connection with the paper. It reported that my experiments showed that most remarkable results were shown at the negative pole. This, *their* conclusion, was completely in error. I wrote them a note of correction, but, probably thinking that I was mistaken in my deductions, they made no corrections. I am proud that Dr. Gillett in his discussion to-day fully supports my contention in the matter. I have made, I think, quite an important discovery. So far we have all been bleaching "with the cart before the horse." We have made use of the positive electrode in the tooth. Experiment has demonstrated that the negative electrode should be substituted. This is in accord with the law of electrical osmosis. For obtunding sensitive dentin we do well to place the positive electrode in the tooth and the negative at some remote place on the body, because the electro-positive element, cocain alkaloid, seeking the negative pole in its journey, naturally penetrates the dentinal tubuli, following the course of least resistance. Just as surely will the electrically disrupted free oxygen of the pyrozone, being electro-negative, seek the positive pole. I shall be pleased to show specimens of comparative bleaching which prove this contention.

The apology of your committee that we are to have a paper on the subject of cataphoresis excuses him for not having discussed the importance of cataphoresis for the treatment of acute pulpitis and pericementitis. Cataphorically applied, I used at first a combination of aconite and iodin; more recently I have employed a preparation called "acodine," which is a combination of aconite, iodin, tannin, and glycerol. We are under especial obligations to the committee for the full and fair report of the method of Dr. Weld, of New York, for treating pulp-canals. I have not tried this method, but some of my friends report that they are not altogether pleased with it. This may, however, be due to the operator's brief experience. For myself, I still stick to gutta-percha cones. If I suspect an open foramen, I use a few threads of cotton saturated with oil of cloves and iodoform. This I try to

propel ahead of the gutta-percha cones, and finally to imbed by pressure in the softened tip of the cone. I find the cotton comes out with the cone if the case has to be treated subsequently.

Regarding antiseptic precautions, too thorough work cannot be done; but it is my firm belief that but for the phagocytes our root treatments would all prove failures. However, our germicides are excellent reinforcements. In acute alveolar abscess, following all your committee recommended for preliminary treatment, with the cataphoric use of the concentrated iodin, or aconite and iodin, very considerable relief follows. If chronic alveolar abscess is not readily cured, then trephining of the alveolus must be resorted to. Dr. W. Irving Thayer, of Williamsburg, Mass., advertises a remedy for the painless accomplishment of trephining. I sent for the remedy, but when I uncorked it my courage failed me. I am very much afraid of cocain in any considerable quantity when there is a possibility that it may be absorbed into the vascular tissue.

I should be pleased if any one will tell me the approximate composition of Dr. Thayer's remedies, until I know more concerning which I doubt if I shall use them.

Dr. Van Woert. In all that has been written and all that has been said, I think in each instance it has been omitted to place on record the credit due Dr. Gillett for making cataphoresis practical in dentistry. It is a pleasure for me to say that I believe we are under deep obligations to him for putting into practical form this very efficacious method of producing insensibility of sensitive teeth.

While we do not now agree entirely in the matter, it was very much worse a year ago. Dr. Gillett has come nearer to my views in the past year than I ever supposed he would, first of all in the practical abandonment of the street current. He does not say that it is positively dangerous, but he admits there is a possibility of danger. The first experiments I made with electricity for the introduction of drugs convinced me of the fact that the current sent out from electric light stations was unreliable. For argument's sake, we will set aside the fact that there is any danger in the street current. On what ground would you find excuse for its use? Simply because it is a little more convenient? Is it more convenient than the small amount of current necessary for producing anesthesia by cataphoric treatment? Our friend, Dr. Rhein, claims that he uses from fifty to one hundred and fifty volts to get satisfactory results. I have talked with him, and he said I must demonstrate it. My laboratory is open to all, and I will show it to you. Wherever the current is of sufficiently high potential, you get a coagulation of the material that is in the tubuli. The nervous matter or the fluid in the tubuli of the tooth, by the contact of the current, becomes coagulated if the potential is too high. The cocain salt becomes dammed up on the surface, and it takes just so much longer to redissolve the salt to introduce it where you want it.

My practice is not to exceed one-fifth of a milliampere. I

do not measure mine by a Weston volt meter. An ordinary pocket compass and a coil of wire will produce as good results as a Weston volt meter for what you want to know. The ordinary meters that are made by any of the supply houses are sufficient to give you one-fifth of a milliampere. If the current is turned on, as in most of the cases, to one-fifth of a milliampere and left there, and the cotton kept saturated with the cocain solution,—Dr. Starr says fifty per cent.; I was under the impression that it was not soluble at that percentage,—I think ten to twelve minutes would be sufficient for the diffusion of the current. The contact of a small platinum point upon a large body of platinum saturated with the fluid in a large cavity is not sufficient. Many cases are recorded where the operator says, "I succeeded in anesthetizing one portion of the cavity, but when I got near the cornual surfaces it was as sensitive as ever." To overcome that, some means must be adopted by which it must be diffused over the entire surface. That is best accomplished by laying over the cotton, not over the tooth, tin foil folded heavy to keep it in shape, and the electrode placed upon that so that the current will pass over the entire area upon which you are working. The point has been raised by Dr. Gillett, Dr. Starr, and Dr. Low that there is very little difference regarding the position of the negative electrode, that the hand or any part of the body is just as good. My experience has been to the contrary,—so much so that the negatives are placed between the cheek and the gum over the tooth being operated on. I get very much better results with less trouble, because there is less resistance between the two points of contact. All you need to do is to go to your bicycle dealer,—I suppose you all have electric lamps. You can buy four small cells for twenty cents. With the four small cells, an ordinary carpenter's pencil, and a piece of copper wire, you can get as good results as with a one-hundred-dollar machine.

If you feel that it is better for you to have an instrument by which you can control the street current as safely as it is possible to do it, get an instrument that is sure, and that you can understand, and that the maker is not ashamed of. While I do not believe in the street current, if you use it be sure that you get a machine that is thoroughly explained to you, so if an accident happens, and you are called before the coroner, you can talk intelligently upon it. In one case a patient had the current applied for a short time with a low voltage. The disease had gone beyond repair, and an abscess had formed. The current had nothing to do with it, but the physician immediately laid the trouble to the electricity. The husband of the lady upon whom the application was made had a friend who was an electrician, and he said it was the electricity, and that the man ought to be arrested for making the application; and there was quite some question whether there was not to be a lawsuit over it. What did the electrician know of dentistry and of the pathological conditions there? What did the physician know of electricity? And yet the innocent dentist will get the lashing for these men's ignorance. You might better pro-

duce your cataphoric effects with the lead pencil, dry cell battery, and copper wire, than have a large instrument that you know nothing about. Suppose your patient dies in your office from a saturated solution of cocain being applied cataphorically, and the coroner asks, "How much cocain do you use as a maximum, how much does your cotton hold, and what is a saturated solution?" I do not believe many gentlemen in the room know. If you have a fixed amount of cocain, whether it is a saturated solution or a five per cent. solution, and the patient dies, and the coroner asks how much you use and you say one-fifth of a grain, and you say a reputable chemist sold it to you, the chemist would be responsible for the quantity and quality, and you for the administration only. Then they cannot pull you over the coals as a man ignorant of the subject he should be well up on. I want to make sure that I can tell what I am using. I do not believe it is possible for any gentleman present to tell what the absolute effect of cocain is, applied cataphorically, because it is too early in the game. The question was raised as to the possibility of using cataphoric treatment in minor operations in the mouth, for necrosis, etc. I do not think it is practicable. I think there are other means by which you can produce the same results. The time has come in my practice when cataphoric treatment has simmered down to a practical thing. The hobby has passed by. I used to play with it a great deal. I used it more times than it was necessary, but that time has gone by. If I can get paid for it I use it. If not, I do not use it.

There is another condition that I want to speak of, and that is the danger of pathological conditions following the application of the galvanic current and the cocain. I believe that there is great danger of the devitalization of pulps, the creation of acute pericementitis, and a number of other conditions that you could not foresee, if the potential of the current is too high and the medicament is continued too long. If you take a small electric lamp of one or two candle-power, and, after making an application to a perfectly healthy tooth, darken the room, you will find that it has exactly the same appearance as a dead tooth with the lamp under it. The natural color of that tooth does not return in many cases for weeks. I have put off the final operation of gold filling until it did return, for fear of the damage I would do. Have I devitalized the pulp cataphorically? I say yes. How do I know? By the same rule that you know you would kill a pulp in any other way. I think many of you concede that if oxyphosphate is placed too near the pulp it will kill it. How do you know it dies from that cause? What is the natural deduction or conclusion? Would you not all consider that it was the cataphoric treatment that caused it?

If you try the experiment I have done a dozen times,—in the same mouth where you have made application of cocain introduce a galvanic current for the same length of time,—you get almost the same condition of discoloration to the reflection of the electric light behind it. That is a very important thing. Those of you who are using cataphoric machines would do well to look into

it and see if your experience is not in accord with mine. To base your deductions upon a purely clinical experience seems all wrong. I believe theory is as necessary to practice as practice to the development of theory. We want the scientific theory of it. The line on which Dr. Gillett has spoken is the true one for getting at the pith of this thing. I think there is no better time, and I do not think there is any better body of men to take up that investigation than right here to-day.

Dr. RHEIN. In regard to the subject of cataphoresis brought up this afternoon, the president has allotted me two minutes, and I will not take up more time. The vagaries of electro-therapeutics are so numerous that it is difficult at the present time for any one to lay down any set rules that can be religiously followed in cataphoric work. In regard to my use of high potentials, I would say that I agree thoroughly with all the speakers who say they are satisfied with one-fifth of a milliampere. In the great majority of patients this can be attained with a lower voltage, but as the resistance of a tooth differs in different patients, it is necessary to increase the voltage, and I fail to see any difference in one-fifth of a milliampere passing through a tooth under a ten-volt pressure or one-hundred-and-ten-volt pressure.

Dr. S. FREEMAN. There has been considerable said about the electric current, but nothing about its action upon the blood-vessels and upon the tissues. There is a certain action upon the tissues, as we know, which may produce retraction of the pulp. The medicament used—cocain—also produces an astringent effect. If the gentlemen who are testing the electricity will also pay some attention to the action of the medicament used, they will give us more in a scientific line than they have in the way of instruments alone.

Dr. GILLETT. I have very little to add to what I have said. I think I stated in the paper enough to make plain my position on the question of the street current. Dr. Van Woert seems to think I have given up the street current. I still use it, and am not willing yet to give up the hope that we may use it safely and satisfactorily. I sometimes use the street current and sometimes the dry batteries. As I said in the paper, the *possibility* of danger must be admitted. The possibility of danger in riding from here to the station in the street car must also be admitted, and I think the danger of riding in the street car is greater. But that must remain a matter of opinion. I do not want to put myself on record on either side of the question yet. I am looking for more information. This question of whether the lightning will strike your line does not seem to me to be very important. It would be just as bad if the lightning struck the line you are running your engine with. No sensible man will use his cataphoric apparatus or any apparatus attached to the street wires during a thunder-storm.

In considering the question of the quantity of current to be used in a given cavity, it seems to me we have not studied the whole case when we say one-fifth of a milliampere is enough. One-fifth in one cavity may mean a great deal more than the same

amount in another cavity. It is a question of the amount of current flow in relation to the size of the cavity. In other words, the density of the current flow.

I have not yet seen the demonstration Dr. Van Woert promises us, concerning a larger current with less voltage. I have not been able to produce it in my own practice. Dr. Van Woert says he does accomplish that, and some day I should like to see it.

One point concerning electrodes which Dr. Van Woert mentioned, and which I intended to refer to in my paper, was the application of the negative electrode to the mucous membrane of the mouth. I have Dr. Van Woert's set of electrodes, and have used some of them with great satisfaction. The use of the negative electrode against the mucous membrane I found quite satisfactory, but patients came back and said I had burned their mouths, and I have adopted the plan of winding it in cottonoid as a protection. It seems to me we will attain the same results that Dr. Van Woert has attained with that electrode,—*i.e.*, reduction of the resistance,—by simply increasing the size of the negative electrode.

The Correspondent, Dr. R. Ottolengui, New York, then read his report, which consisted mainly of a series of replies from the presidents of state dental societies to a circular-letter which had been mailed by the Correspondent asking for an expression of opinion upon the advisability of petitioning Congress to enact a law restraining the granting of patents upon any method of treating human diseases, which would also include dental operations.

The circular-letter further requested the coöperation of the societies addressed to the extent of appointing a committee whose duty it would be to bring to bear the influence of the profession of the state in question upon their Congressmen and Senators when the bill is finally formulated.

In answer to the circular-letter there were received thirty-two replies, generally in favor of the movement. In view of the favorable expressions received the report asked that the New York State Society inaugurate the movement toward securing the desired legislation by Congress.

Following is the discussion on the report of the Correspondent:

Dr. Crouse. When Dr. Ottolengui wrote me in regard to his movement, I thought that his description was vague, as I could not conceive of any form of treatment of human disease as patentable, and there is no form of combinations patentable, except in compounding whatever they see fit and getting the name copyrighted. Therefore, the last few communications, where the lawyer said he knew of no such invention that was patentable, were correct. For fear I am misrepresenting Dr. Ottolengui's position, I should like him to define a little closer what he means by processes.

Dr. Ottolengui. The point is this: I know of an article which is supposed to obtund sensitive dentin; it is a manufactured article, and there is a patent on it. When you buy it you pay for it. That I consider to be perfectly legitimate. In addition to that, however, this man has another patent which allows him to say that

you cannot use his machine, after you have bought it, unless you pay him fifty dollars a year. He has already sold you his machine, but he wants you to pay for using it. I think that is reprehensible. He should not have that double privilege of exacting payment first for the article, and then a license fee for using it. Suppose some man had originated the cataphoric treatment of dentin, and he had been able to tell every man in this country who uses cataphoresis that he must pay a license on it. It is well enough to say that those patents are invalid, but they do exist. The Dental Protective Association have been obliged to spend a great deal of money on the patents on crowns which they have been fighting. I see no objection to a patent on a thing which you can buy and then use as you like; but if a man makes a crown and sells it to you and then says you must pay him five or ten dollars, or even ten cents a year, I think that is reprehensible. It is not the feature of a manufactured article or the process of manufacturing it that I object to, but the patent which allows a man to come into your office and say, "Every time you do this operation you must pay me a license for it."

Dr. CROUSE. It is clear, but not correct. There is no patent on any operation for obtunding sensitive dentin. There may be some combination for the name of which they have a copyright, but you can analyze it, put the same things together, call it a different name, and the law will not touch you. There was the Hale method, which was called the painless system of dentistry. It was like buying a pig in a poke, and there was a contract that you must not divulge the secret under penalty of five thousand dollars. Each man who signed it did so under a bond that made him liable. I induced one of the signers of that contract to have it amended so that his assistant, not being liable by law, could use it, and as soon as the assistant secured it he gave it to me, and then I started after Mr. Hale.

Dr. OTTOLENGUI. What about the Horton machine? He claims to have a patent on the machine; and after he sells it to you, he claims to have a right to exact a license fee from you for using it.

Dr. CROUSE. There is a process patent known as the Stedman, which is merely the various steps in making and attaching clasps to plates. We are at the present time defending a member of the Protective Association in a suit which has been brought against him on this patent. If that were not true, it would hold; but being a process patent, you can change one of the processes and use it without infringement. We have about convinced Mr. Stedman that we can win in court. The dental profession was paying him twenty-seven thousand dollars royalty, as he had over eleven hundred licensees. That patent was not on the treatment of disease; I cannot conceive what would be a process that could be patented. If you make an application to the Patent Office, you must give a certain description of what you desire to patent. The Hortons claim a great deal, but at Saratoga we could not get them to show anything.

There are many men in New York who are not members of the Dental Protective Association, and when some of those cataphoric apparatus people get at them they will come to us. A few years ago there was a movement on foot to petition Congress to change the law so there could be no patents on dental instruments, but you will not get the authorities to change their patent laws for a handful of men.

The Dental Protective Association was something of an experiment. Many men would not join, but went on paying the licenses. One firm in New York city paid over six thousand dollars license fees to the Crown Company, while the rest of us paid ten dollars a year to join the association and came out ahead.

I bring it before you now in another form. It is no longer an experiment, as things have been accomplished. There is hardly a man in New York who would not be paying royalties if it were not for the Dental Protective Association, yet only about one-fifth of the dentists belong to it. There are some bills to pay, and either we must get one thousand new members or the membership must help pay the bills. The first way is the best way. There are men in this room who, if they were properly approached, would join. Many men do not know anything about it, and many men think it has been an easy time for me to do all this. If we had done what was proposed earlier in the game, to close the doors, give these patent companies the names of the non-members and refuse to take any more into the association, you would be sorry you did not come into this organization, and would either organize another one or else would pay royalty. I never felt like adopting any such measure, and for that reason consulted other members in the profession, for whose judgment I had great respect, and almost unanimously they did not like that plan, but thought those other men would come in. That was five years ago, but there has not been much increase during that time. There have not been any men bothering you to take out these licenses, and that alone ought to be worth ten dollars to you. If the Crown Company and the others would hunt you up every month or two you would be glad to pay the ten dollars. I have come before this society to-day, as the place where I think the claim is the strongest, because it was in New York state and Connecticut that we had any fear whatever of the Crown Company beating us on the suit. They had had the thing passed upon. We chased them from all the courts, and they were bound and determined to try the case where they had a decision in their favor. The judge appointed by the higher court goes into the same federal district and reverses the decision of the higher court. We were afraid we would be beaten here, and that the dentists in this federal district would suffer. Now the state of New York is absolutely free from the Low Bridge Patent and several others. They want to go to the federal courts and try it again there. We know very well that it is not only the Crown Company, but there are other companies, and we do not know what may take place. The association ought to be in existence for protection against other things that may turn up. Eight or nine

years ago I said in a circular that with the fund started we could employ such original work as Dr. Black is doing, and get full investigations. I expected long ago that we would have ten thousand members, but we fell short of the mark. I want this society to appoint a committee and get members. A man who is respectable enough to belong to a local society ought to belong to the Dental Protective Association. There is not much I can do any more. They have become tired of me and my circulars, and each man must take hold and help. I hope we will get the noble support which the state of New York can afford and ought to give.

Dr. Le Roy. I believe Dr. Crouse made some reference to a process of devitalizing pulps?

Dr. Crouse. Yes; cutting off the crown and driving out the pulp with a stick.

Dr. Le Roy. Could that be patented?

Dr. Crouse. Well, it was patented.

Dr. Ottolengui. The subject is bigger, in my mind, than Dr. Crouse will admit. I am an ardent supporter of the Dental Protective Association; by personal solicitation I obtained between thirty and forty members for the association, and therefore I am not an antagonist of it. Dr. Crouse tells us that any patent such as I described, by which the dental profession can be harassed, is invalid. Then he says the Dental Protective Association should be continued,—an association organized and kept up solely to protect people from being harassed by such patents. If they are invalid we should not be troubled by them, and we do not need the association. If Dr. Crouse and his association will undertake (instead of asking us to continue the association) to make it impossible for the association to be needed, I will guarantee to get one hundred new members. I will get one thousand dollars toward it, if he undertakes the movement I advocate, so that in the future the association will not be necessary. It is well enough to say the crowns are not processes, but a crown which a man must make himself, utilizing part of the human body as part of the process, is just what I mean by a process. If a man sells 18-carat crowns at two dollars and 20-carat crowns at four dollars, let him have all the patents he wants; let him patent what he can manufacture and sell, but do not let him have a patent on the process which requires part of the human body.

Dr. Jarvie. It seems to me the discussion so far upon this paper of the correspondent has brought up three entirely different questions. As the correspondent has just put it, and I wish he had put it as plainly in his paper as he has said it now, undoubtedly such an effort as he has suggested would be a very wise thing for us to second, and it would be well for us to do everything in our power to bring it about. The laws of this country and in some countries in Europe are entirely different regarding the granting of patents. In Germany no patent is granted until the question of its validity has been looked into. When the patent is granted it is *prima facie* evidence that it is valid, and the owner of the patent is not required to go into court to sustain it. In this country, how-

ever, you can get a patent granted for almost anything, but after you have the patent it is the owner's work to protect his patent in the courts. That is just where we are called upon, as members of the Dental Protective Association. There are undoubtedly patents granted that are invalid, and we must defend ourselves from the exaction of the owners of those patents. In the past, less than one-sixth of the profession have been paying the money and a very few men, principally Dr. Crouse, doing the work, and the other five-sixths of the profession have been deriving the good. This condition of things must stop. The association is about at the end of its money, and unless more members or more money is obtained the benefit of the association will be no longer extended to the members of the profession at large. There has been a proposition made that the members of the Dental Protective Association should receive rights to use these patents as long as they exist, and to no longer contest them, and allow those who have been receiving the benefits of the association to fight it for themselves. The majority of those who are members of the association entered it and entered the fight as a matter of principle. They were determined that the dental profession should not be the prey of any such harpies as those tooth-crown companies, and if this Dental Protective Association goes out of existence just such companies as that will spring up like mushrooms. What shall we do? Shall we reinforce the treasury by the accession of new members, or shall we throw the profession open to such people? It would take very little to turn it in one direction or the other. I have no doubt that some men in this room are not members of the association. They have received protection during all this time, but have not paid anything. Is it fair?—I was going to say, is it honest? but I do not think they are doing it from any cause except thoughtlessness. I do not know of any man in the United States that would make the sacrifices that Dr. Crouse has made for this work.

Dr. Barrett. A certain man of Buffalo origin once enunciated this aphorism: "It is a condition, not a theory, that confronts us," and it is particularly applicable in this instance. When any one has you by the throat, it is a poor time to appeal to the Legislature for an act forbidding him to choke you. The first thing is to get his hands off your throat. It is a poor time to speculate upon what the law is, or might be, or what we might secure through legislative interference. It is a condition and not a theory, and there are oppressive patents already granted which are in active operation at the present day. The only way in which we can sustain the right or defend ourselves is to put up our clenched fists and intervene them between ourselves and the opposing forces. I am praying for the millennium, and am looking for it; but I do not think I will see it before the expiration of this patent. I propose, so far as in me lies, to use all the defensive measures I can while waiting for that desirable condition. I am a member of the Dental Protective Association, and have paid my second assessment, and I am willing to help pay for others, but I do not want to carry all of the burden; and now that the weight has become too

heavy for those who have been carrying it in the past, it is a mean disposition that will allow those men still to stagger under it. Dr. Crouse has labored faithfully in this thing. I have not always approved of all his methods, but he has fairly earned the right to have his own way. What he has done has been for the benefit of the profession, and that man who lives by sponging upon his labors, who is too small and too mean to pay even a small proportion of his own defense, is unworthy a place among honorable dentists. I will raise my voice against helping any man who will not bear his share of the burden. If a man is in a sinking boat and he will not help to bail it out, let him go down, boat and all.

Dr. W. W. WALKER. I would like to say just a word on this subject of the Dental Protective Association. For the last two or three days I have been with Dr. Crouse and other dentists in New York city, knowing that he expected to be here and that he wanted assistance to fill up the membership and pay this debt. It was a mystery to me how we could accomplish it, but inasmuch as Dr. Ottolengui has been here and read his paper, I think I now can see our way clear. If Dr. Ottolengui will use the influence of his journal and write as many letters to dentists all over the United States as he has for the last month, and help us and other dental societies in paying off the debt of the Dental Protective Association, it will help Dr. Crouse out, and then when the bills are paid and there is a sinking fund, if any of the men come with their patents Dr. Crouse and the association will take care of us. Then we will not have to bother our Congressmen about it.

Dr. STAINTON. At the close of this session there will be meetings of each district society. I move that at those meetings each district nominate a member for a committee on this very subject of the Dental Protective Association.

Motion seconded.

Dr. JARVIE. Every man in this room is a member of a district organization, and consequently every man would attend those meetings.

Dr. CROUSE. I have been asked how I get along with so much litigation with so little expense. It is not a little expense, but it is less than half what the lawyers on the other side are getting. I made a contract with our lawyers when we began this thing.

Motion carried.

NEW YORK ODONTOLOGICAL SOCIETY.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, March 16, 1897, at the New York Academy of Medicine, No. 17 West Forty-third street; the president, Dr. William Carr, in the chair. The secretary being absent, Dr. W. J. Turner kindly consented to act in his place. The reading of the minutes of the last meeting was dispensed with.

Dr. WM. JARVIE. At the clinic this afternoon Dr. C. W. F. Holbrook, of New Jersey, presented two patients for whom he had made interdental splints to treat fractured lower maxillæ. Dr.

Delos Palmer showed a new and effective process of filling pulp-canals by the use of balsam and a broach heated by electricity. Both gentlemen are present, and will give detailed accounts of their clinics.

Dr. Holbrook. The case I presented was a fracture of the lower maxilla. It was a double fracture between the first and second bicuspids on the right side, and at the angle of the jaw on the left side. The splint was put in place on the first of January, and remained there for five weeks, the patient having no pain from the time it was put on. In inserting this to make it rigid, it was set with oxyphosphate of zinc. When his jaws were closed there was no chance whatever for movement, and at the time of the removal there was perfect union. There was no need of any regulating or change of the natural occlusion of the jaw. It was simply the result of nice, careful manipulation and handling the case properly. The patient was twenty-six years of age.

The President. Do you still use fixation?

Dr. Holbrook. Yes; in this case I did. The other case was a compound fracture of the lower jaw and a simple fracture of the upper jaw. The patient fell from the roof of a three-story building, and was very badly broken up. She was a woman sixty-three years old. The result showed what could be done. She was here with a double set of teeth, and is alive and well.

The President. How did you treat that case?

Dr. Holbrook. With the ordinary splint for the upper jaw. For the lower jaw we wired it, but that was not wholly satisfactory, and we used a bandage splint in the end. She has very few scars, and is in good health to-day. She had no artificial teeth at the time of the accident.

Dr. Jarvie. The second case Dr. Holbrook has reported is very remarkable. The woman was sixty-three years of age, and a deaf mute. By the accident she lost one eye and broke several bones. She has almost entirely recovered, and wears an upper and lower set of teeth, and has perfect use of the joint. The first case—that of the young man who met with the accident in January—has now fully recovered; the splint was beautifully made and adapted.

Dr. Bishop. I should have been very glad to see this splint in the mouth, but I had to leave the clinic at 4.30 and could not return. I do not think from the report made this morning that there has been any improvement over those described in a paper read and illustrated before the New York Academy of Medicine, June 1, 1864.

Dr. Delos Palmer. Since last August I have been working at root-filling with this little instrument I show you. I claim nothing new in filling roots, but simply want to show this for the application of medicine in the roots. It is nothing more than a regular cautery instrument, with a little iridium tip to it, which can be placed in any position you desire. It will carry the balsam or any medicament you want to place in the tooth, right where you want it. I have practiced for thirty-three years, and have never had

anything that has given me such satisfaction as this little instrument.

Dr. Palmer showed his root-filling instrument, and demonstrated its use.

The PRESIDENT. What do you solder it with?

Dr. PALMER. Twenty-carat solder. I use the Balsamo del Deserto, sold by The S. S. White Company.

The PRESIDENT. What percentage of failures do you have?

Dr. PALMER. I have had no failures so far. All the roots I showed you here to-day were filled out of the mouth. I have filled twenty-four roots, some with balsam and cotton, and some with balsam and pins. When you use the pin you can withdraw it any time you wish, and you can put the heater in and open the root any time you wish. It is all done in a few minutes.

Dr. JARVIE. I saw Dr. Palmer fill a number of roots out of the mouth this afternoon. It is the most beautiful way I have ever seen of filling root-canals, and I do not see why they should not be correspondingly well filled in the mouth. There is no doubt of the antiseptic properties of this method of treatment. It is the first I have ever seen of satisfactorily conducting heat to the extreme end of the root-canal. By inserting this small broach-shaped wire and turning on the current, you can get the extreme end of the root as hot as you wish. In using a current of hot air from a syringe, I do not think the heat extends far into the canal, but by Dr. Palmer's method the heat can be carried to the foramen. As to the completeness of the filling of these canals so treated, there seems to be no doubt, as far as the demonstration could show this afternoon. I would recommend it to you all,—to try, at any rate. To my mind it is the greatest advance yet made in root-canal filling.

INCIDENTS OF OFFICE PRACTICE.

Dr. S. G. PERRY. I have here some X-ray pictures showing the absorption of the temporary teeth. They were sent to me by Dr. Dwight M. Clapp, of Boston. Dr. Clapp writes that the tooth shown to be absorbed is a dead tooth, and he refers to an article of mine published in the *International Dental Journal*, March, 1894, in which I stated that "it is well known that the roots of dead teeth are not absorbed, as is the case with the living ones." Dr. Clapp evidently thought I intended to convey the idea that the dead temporary teeth are not absorbed at all. I did not intend to say that,—I meant to say "are not absorbed as living ones are." I think that statement will still stand, in spite of the X rays.

Dr. LITTIG. I have always understood that if the root was entirely denuded of the pericementum they would not be absorbed; but if the pericementum remained alive they would. If I am not correct, I would like to be informed on this subject.

Dr. PERRY. This is a very interesting question, and we would all like to know about it. Is it not true that you do not expect dead temporary teeth to be absorbed as living ones?

Dr. WELD. In the case of teeth which have been replanted, is

there not a similar absorption,—*i.e.*, is it not the giant cells which produce the absorption?

Dr. HODSON. I would feel that they were not absorbed in the ordinary way in which live roots were absorbed, and have always counted on that in their treatment. I have found, however, a much slower and smaller amount of absorption of these dead ones which seems similar to the absorption of necrosed bone elsewhere.

Dr. JARVIE. I think the roots of pulpless deciduous teeth are absorbed, although not quite so rapidly as those with live pulps.

Dr. B. C. NASH. Dr. J. Y. Crawford, in a discussion relating to treatment of the dental pulp (DENTAL COSMOS, vol. xxxviii, page 162), advises the retention of pulpless deciduous teeth, and after treatment fills the pulp-canals with a sterilizing paste, grinding off the morsal surfaces from time to time, so that the teeth will be non-antagonizing,—calculating on exfoliation rather than absorption.

Dr. WATKINS. It seems to me that the absorption in a pulpless tooth and a live tooth are entirely different. In a pulpless tooth the tooth is pressed out of its place, and if there is absorption it takes place on the side of the root, and there is very little absorption at that. But in a live tooth, as you all know, the entire root, completely to the enamel, will be absorbed. One is a natural process, and the other is mechanical.

Dr. PERRY. I made at that time a plea for retaining the temporary teeth in position until it was time for the permanent teeth to come in. My own experience, now that my attention has been called to it, has been something like that expressed by Dr. Watkins, that the temporary teeth are somewhat absorbed. If they lose their pulps I expect them to be partly absorbed, but considerably pushed or pressed out by the permanent teeth. I think I am on pretty sure ground after all, because I found I had said in my statement that they were not absorbed as *living teeth were*. I still do not believe they are absorbed in the clean way that living ones are.

Adjourned.

A REGULAR meeting of the New York Odontological Society was held on Tuesday evening, April 20, 1897, at the New York Academy of Medicine; the president, Dr. William Carr, in the chair.

REPORT OF THE EXECUTIVE COMMITTEE.

Dr. WALKER. There were about forty members present at the clinic to-day. Dr. Shumway, of Plymouth, Mass., demonstrated his method of filling teeth by the use of tin and gold with ivory points. Dr. Hanning, of Brooklyn, had a patient present, and Mr. Clark, of Boston, demonstrated his new cataphoric instrument. The gentlemen are present, and will explain their clinics in detail. The Transactions of the society are here to-night, and are ready for distribution.

Report accepted.

Dr. SHUMWAY. Most of the members were present and saw the clinic. It is simply the union of tin and gold by affinity, not by

incorporating or interlacing them. It makes a filling that is very superior. I have only used it since last July. I should not want any one to begin to use it, believing that it is everything that can be desired; but I think it contains a principle that will be very useful. I put in the tin the same as those of you who are familiar with the operation of filling teeth with soft or non-cohesive gold and tin know how it is put into a tooth. Tin works differently from gold, because tin is not crystalline in its composition, but granular. It works by interlacing, it is interdigitous. You can form one piece of tin into another, and it holds without retaining pits, or undercuts, or dovetailing. I make a cavity not exactly saucer-shaped, but so that it has retaining walls; I fill it nearly full of tin and cut out below the enamel line, and after it is solidified, I take an excavator and cut around so none of the surface of the tin will show. I think it unites because tin bears about the same relation to the other metals that an oyster bears to animal life,—it is a sort of connecting link. There is no affinity, but it does not resist. I polish the surface with an ivory instrument rather than a steel one, because there is something that comes off the surface of the steel on to the tin, which is not favorable to the union. I use the lowest number gold, No. 3; that unites with the tin better than the higher numbers.

Dr. JARVIE. Do you anneal each piece?

Dr. SHUMWAY. Yes; you heat it red hot. I take the tin fresh out of the book every time I use it. I never use old tin. If I have taken out more than I want, I either throw it away or put it into a bottle that will exclude the air, because you know tin will oxidize very rapidly. I polish the surface of the tin, and then put just a single thickness of the No. 3 foil first; I lay it on the surface and it seems to go into it. You can put two or three pieces and then scrape it, and you find it scrapes off very easily.

Dr. JARVIE. Do you use the ivory-pointed instruments for that?

Dr. SHUMWAY. Yes; I can take a piece of block tin and rub it down bright with an ivory instrument, and then lay a sheet of cohesive gold on it, and rub it over with an ivory instrument and it will not rub off; but if you take a burnisher, you can peel it off. You want to keep the gold as soft as you can. I found by experiment that I could take the block tin and roll it up by using a burnisher. It is a soft filling when it is finished. If it is a molar and the cavity is on the grinding-surface, and you use No. 60, you will have a surface that will bear a great deal of wear. I have some fillings that I took out after two months, to show how perfect the union was. It shows where the occlusion came, and also that the union was not affected or disturbed by the use. When I first began to do it, I thought I had to have a rough surface on my tin, so as to depend on the interlacing of the tin; but I find it is better to have a perfectly smooth and bright surface—the brighter the better.

Dr. W. W. WALKER. Do you never use a steel burnisher?

Dr. SHUMWAY. No.

Dr. WALKER. What would have happened if you had used a steel burnisher this afternoon?

Dr. Shumway. Nothing; only it would not look as well. It would have been a wavy surface, and not a smooth one. Of course, it would wear smooth. The tin is a soft metal, and the gold I kept as near the condition of the tin as I could. I am after the preservation of the tooth first of all. You never improve cohesive gold by attempting to work it after you have gotten it where you want it. You crystallize it and break it up, but you do not add to it.

Dr. John I. Hart. A couple of months ago I saw Dr. Shumway demonstrate his method before the First District Dental Society, and since I have taken occasion to practice it a few times. I would suggest in line with the doctor's remarks, that the first few pieces of gold should be smaller than the cavity, rather than larger. I found in using pieces larger than the cavity that there was a tendency to crinkle, and I did not get the adhesion which I get from using pieces smaller than the orifice of the cavity. In a filling I put in outside of the mouth, I afterward broke the tooth in half. Using considerable pressure with an excavator, I was unable to detach the gold from the tin. The few fillings I have put in in the mouth have been on the buccal and labial surfaces. On those I put in teeth outside of the mouth, the greatest possible adhesion was produced on the edges of the teeth. The gold being extremely thin, is adapted to the edge, and very little pressure is exercised in carrying the gold to the wall. We get more perfect edges than with any other method.

Dr. S. G. Perry. I was very much impressed with this operation of Dr. Shumway. The gold seemed to be firmly attached to the tin, and held well until the completion of the operation. The operation was performed so easily and so simply that it was very gratifying to see it, and I had the feeling that the method had artistic possibilities. Small pieces of gold can be wiped up against the edges so artistically and so gently, that it takes away the idea of the blacksmith hammering, and the carpenter crushing, and gives an artistic idea to it, which is very pleasing to the operator and to the patient. If that practice can be followed up to any great extent in cavities throughout the mouth, it will make our work easier than it is at the present time.

Dr. Shumway. In regard to the necessity of the first piece being put on perfectly smooth, I would like to say that I am very careful to use only one thickness of the gold, the first layer as thin as foil. If it is too large for the orifice, you can lap it over and put the second layer on. It is better to take a small piece and begin very cautiously, because you may spoil the whole thing if you do not. In regard to what Dr. Perry said, I would say that in my practice at home I do make the undercuts. If this thing fails on me, my reputation as an operator is gone. I must make it succeed, so I take all the precautions that Dr. Perry has spoken of, by making a little undercut, so that although I have the union of the two metals, I also have the undercut to make assurance doubly sure. I did not, however, do it here. I gave the gold and tin all the advantage, so if it were going to tumble off it could do so.

Dr. J. H. Hanning, of Brooklyn. The case I presented was of a young lady thirteen years of age, who had been operated upon at the age of two years for necrosis caused by scarlet fever. The germs of the second bicuspids and the molars were apparently lost with the necrosed bone. From the angle of the jaw to the chin there was a scar on each side. The upper maxilla was rather over-developed in the premaxillary region, and the teeth protrude very much and give the patient a very undesirable appearance. She is beginning to feel the pride which every young woman does in her appearance. What I shall do with it I have not decided, but soon I shall make an attempt to regulate the upper maxilla and see what can be done with the scar-tissue.

Wm. Edwin Clark, S.B., Boston. I wish to give what I consider the correct principles upon which a cataphoresis rheostat should be constructed. The first important point is to have a very high resistance in the circuit. We may take the average resistance of the tooth, the body, the damp cotton wad in the cavity, and contacts to be something like 50,000 ohms. The resistance of the wad of cotton might rise, if the cotton got dry, so that the total resistance of the body, tooth, cotton, etc., might become as much as 100,000 ohms. If a large resistance such as 500,000, a million, or several million ohms were in circuit in series with the tooth, this increased resistance due to the drying of the cotton would be comparatively small in proportion to the total resistance of the circuit. With this high resistance in circuit in series with the tooth, the dried-out cotton of high resistance can be moistened, and although the resistance of the cotton is decreased from 50,000 ohms to almost nothing, the total resistance of the circuit is changed but a very small per cent., and the corresponding increase of current is not great enough to give unpleasant effects. Now take a similar case where there is no resistance in circuit except the body, tooth, cotton, and contacts. The total resistance is the same, 100,000 ohms. The resistance of the dried-out cotton is the same, 50,000 ohms. When moistened the cotton changes its resistance to almost nothing, and the total resistance is halved, thus doubling the current. Quite unpleasant results may follow when the current is thus increased 100 per cent. With high resistance it is necessary to have high voltage. One hundred volts or more is preferable, although it need not necessarily be the commercial current. Even 220 volts is sometimes used in preference where available, it being found that better results can be obtained. Even 500 or any high voltage whatever may be employed, but it should be thoroughly understood that if these higher commercial voltages are used it should be done only by those who understand the matter fully enough to know whether or not the instrument employed is suitable and properly designed for the purpose. In case the very high voltages, 200,000 to 800,000 volts from the static machine, are to be employed, then the condensers should be disconnected from these machines so that the current shall be unidirectional. It might not be out of place here to mention the capability of the static machine. Dr. Henry W. Gillett, of Newport, R. I., and myself were able,

through the kindness of Professor C. A. Adams, of the Lawrence Scientific School, Harvard University, to measure the amount of current given by a Stanley-Toepler-Holtz machine. This machine was built for Rœntgen-ray work. Its voltage, when revolved rapidly, is probably something like 800,000 volts, the machine giving a spark six to ten inches long. By the aid of a very delicate D'Arsonval galvanometer, capable of reading to a billionth of an ampere, the current flowing was found to be from zero to two-tenths of a milliampere, according to the speed of rotation. Roughly speaking, the current and voltage seemed to be directly proportional to the speed of rotation of the revolving disc. After having a high resistance and a high voltage, the next most important consideration is to have the resistance properly divided. An ideal apparatus should have a very large resistance divided into a very large number of very small steps. The maximum and minimum current desired being determined, the resistance should be so proportioned that the minimum current multiplied by the number of times that there are steps would equal the maximum current. There should be a large number of steps, 100 at least, and 150 is better. Very elaborate instruments for experimental work have several hundred or a thousand steps, so that the increments of current are very small indeed. Such instruments as these, especially when made to be run by electric motors controlled by foot switches, involve considerable machinery, but they are very convenient and enable one to carry on an operation in a very satisfactory manner. A machine with a large number of points will also enable an operator to do somewhat quicker work and do it more painlessly, for the reason that the tooth will bear several small increases of current better than one equivalent larger one. The third consideration is that it is better to have all the resistance in circuit properly divided up half on each wire, so as to avoid the possibility of getting short circuits and shocks. There is almost no possibility of any trouble from high voltages in the large cities, but in country districts there is a possibility of shock from lightning or from arc light circuits. It is highly desirable with high voltage or low to have the resistance divided up half on each wire. First the current should pass through one-half of the permanent resistance, then it should pass through half of the variable resistance of the instrument, then through the body, then through the other half of the variable resistance of the instrument, and finally through the second half of the permanent wall resistance. It is desirable to have the permanent resistance separated and some distance away from the variable resistance of the apparatus. The physiological effect of electricity is due to the amperes or fractions of amperes flowing, and not to the voltage. The voltage has no physiological effect after the current has reached a steady flow. At the make and break, which should never occur except when the current is very small, there is a different condition, and the voltage seems to produce an effect on the system, giving a shock. If the resistance is inductive the shock may be quite severe, and so it is important to use a resistance that is non-inductive. (An inductive resistance is one that

is made up of wire wound spirally.) The high voltage is helpful in maintaining the circuit, the increased resistance of moving or poor contacts at the tooth being more easily overcome by the high voltage than by the low. Many of you have doubtless been interested in the very interesting and instructive article by Dr. Price before the Ohio Odontological Society. Most of the article is excellent, but there is one error in the paper, it seems to me, that has brought the author to wrong conclusions. Dr. Price speaks of the living tissue having different resistances at different times. If the resistance of the tissue is variable and if it is any considerable part of the total resistance in circuit, then the variation of current in such a circuit with no outside resistance would be quite marked, whereas if there is also a large outside resistance in circuit the variation of current due to the variation in tissue resistance or any other resistance will be quite small, and will have no ill or disagreeable effects.

Therefore I should disagree with this particular conclusion of Dr. Price considering the resistance of the circuit, and should say that it was important to have as high an outside resistance as possible, so long as it is non-inductive, and that it was wrong to keep the resistance of the circuit as low as possible. I should like to give the credit of first bringing to my attention these essential factors of (1) high voltage and high resistance, (2) many fine divisions, and (3) binary resistance, to Dr. William Rollins, of Boston, Mass., who has given much attention to this problem for a number of years. We have held to these fundamental principles in the construction of our rheostats throughout, although the details have been changed somewhat from time to time.

Mr. Clark then showed his instrument and explained its use.

Dr. F. T. Van Woert. I am very sorry I did not know the subject of cataphoresis was coming up this evening, as I should have brought with me some documentary evidence to prove the position I have taken in regard to the street current. From a mechanical and electrical standpoint, there is no question but that Mr. Clark has reached the ideal control for the street current; but I cannot see the necessity for such an instrument. What he says regarding the electrolytic change that takes place in the medicament is of more importance than we generally credit it; this together with another change, that of the parts operated upon, which I term an electro-pathological condition. It is well known that when a galvanic current is applied to the soft tissues, there is a coagulation or contraction. The more current tissues will carry without contraction or coagulation, the more readily will they absorb the medicament. With six or eight volts I can get better results than when I increase the voltage sufficient to cause pain. If there is pain present, there is always a coagulation or contraction, notwithstanding relaxation takes place if the current is maintained at an even voltage, but not before there is a damming up of the medicament on the surface, which after the relaxation has taken place must be redissolved before its absorption takes place. This leads to the conviction that a very small amount

of current is required to obtain the best results in dental cataphoresis. If this is so, I fail to see the necessity of so complicated and expensive an instrument, particularly when used with battery current. Of course if the street current is to be used, the best instrument to be had is not any too good. I am confident that I can produce as perfect results with four or five dry cells and a common lead-pencil as a rheostat, and in less time than with any instrument for controlling the high voltage. As you all know, I am opposed to the use of the street current for this purpose. I have in my office letters from such men as Thomas A. Edison, who declares the street current positively dangerous. Another prominent authority declares that its use should be prohibited by law in electro-therapeutics, and he gives very logical and scientific reasons why this is so. Those are the letters I should like to have read to you to-night. I demonstrated the extirpation of a pulp with two-fifths of a milliampere. I used to think I had to have three milliamperes, and it would take me from thirty minutes to two hours to get the results. I simply brought about the same condition I named in the beginning,—the contraction or coagulation. That increases the resistance, from the fact that it was drawn up and would not allow the passage of the same amount of current. The teachings we have had in the past have been that as the feeling from the effects of the current passed off it should be increased. That was my practice at first. The dressing of cotton should be kept saturated with the medicament. The principle upon which Mr. Clark has described this is practically that introduced by Dr. Gillett, through Mr. Wheeler. If you were to see the construction of the Wheeler volt selector, you would find there is a fixed resistance. One thing is evident,—that the necessity for the control of a high voltage current is out of the question for practical cataphoric treatment in dentistry. As to the amount of current required for the introduction of remedies into the tissues of the leg, for instance, Dr. Turner can bear me out when I state that with two dry cells I produced results that could not be produced with ten cells. This was because of the perfect diffusing of the current. Ninety-nine out of one hundred use a small platinum point for the application of current. Take, for instance, a molar of which half of the coronal surface is gone; what might we expect from the contact of this small point? Simply an imperfect diffusion, as the medicament used is an imperfect conductor, and the current will seek the direction offering the least resistance. The consequence is imperfect anesthesia; while if tin foil is laid over the entire surface of the cotton containing the medicament, the current is distributed throughout the entire area, thereby decreasing the resistance materially and giving perfect insensibility of the whole cavity. In clinicking I have had cases where a certain portion of the part to be operated upon responded and other portions did not, which was because the current was not diffused over the entire area, as I have just stated. Of two things I am convinced beyond question: First, a very high potential current; second, the perfect diffusion of the same is the essential condition for practical dental cataphoresis.

Dr. PERRY. How large a mass of tin foil do you use?

Dr. VAN WOERT. Enough to cover the cavity; fold sufficient to have it stiff enough to maintain its position over the cotton. Then the cotton must be kept thoroughly saturated with the solution. The change in the resistance that takes place in the beginning is due to the contraction or coagulation of the nervous matter in the tubuli of the tooth. That is maintained and carried out because of the damming of the salt on the surface, and you must dissolve it again to get the current where you want it. The next case you get, if you cannot do it without causing pain, follow the instructions I give you, and I am sure the results will be much more pleasing.

Dr. W. W. WALKER. I read that an operator in California does that, and he gets a dark stain.

Dr. VAN WOERT. I do not place it near enough to the floor of the cavity to get such results. I place the cotton in the floor of the cavity and the foil over it. You get very little staining, and that only on the surface of the cotton.

A MEMBER. Is your tin pressing on the dentin or on the enamel?

Dr. VAN WOERT. It is pressing on neither, but upon the cotton. You should fill your cavity with cotton. I have not had any such results. I use tin foil, and only use it once. By careful experiment you will find that what I have told you is true. I know the amount of current required for cataphoric treatment in teeth is infinitesimal. With the twenty cents' worth of cells, a carpenter's pencil, and some copper wire, you get enough current to produce satisfactory results in a few moments. Of course they will not last as well-made instruments would. One thing is sure: Whatever the resistance is, the argument in favor of the safety of street currents that fuse wires are a protection and safeguard against the dangers occasioned by the crossing of other high potential wires is misleading, because before the fuse wires become operative the damage has been done. As the editor of *Electricity* says, the time might be so minute that it would be hardly possible to calculate it, yet when you consider that electricity travels over 160,000 miles per second it can be readily understood that before the wires melt the patient will have received enough of the shock to be exceedingly disagreeable, to say the least. He further says the legislature should make some provision prohibiting dentists and physicians from using the street current for electro-therapeutic purposes.

I want to say a word or two respecting the X rays. I have been working for a long time to make them practicable for dental purposes. To do that has been considerable of a task, because of the time of exposure necessary. Most of the cases I undertook required from eight to fifteen minutes' exposure to get satisfactory results. Lately I have found it possible to obtain just as good pictures with a one-and-one-half to two-minute exposure. This is accomplished by the plate-holder I have with me, consisting of hard rubber and lined with the tungstate of calcium, forming a fluorescent screen, the same as in the fluoroscope. This salt consists of

the tungstate of sodium, the chlorid of calcium, and common salt, equal parts, fused in a crucible until liquid, and then allowed to cool. Then you have what looks like a piece of glass, which is placed into a jar or beaker with water and decanted until the water ceases to taste of the salt; the residue at the bottom forms the crystals of tungstate of calcium. I think by the use of this little screen it is possible to get a good practical negative for all the purposes you require in one or two minutes. You place it in the mouth, right opposite the tooth you want.

Dr. Wm. Jarvie. I wish to say a word in reference to the many cases where if we could get good X-ray photographs of conditions about the jaw it would be exceedingly useful to us; for instance, in cases of impacted third molars, if we could know the exact location of the teeth and the direction of the roots; and in cases of non-eruption, if we could know if the teeth are in the jaw and the position in which they lie. Often, in cases where there is irritation or inflammation about the roots of the teeth, we can only guess the cause; if we could see the end of a probe or broach protruding through the foramen, we would know at once what to do; or if we could see the side of a platinum pin on which a crown was set sticking through the side of a root, we would know what to do. I can imagine a large number of cases in which an X-ray photograph would be exceedingly desirable for us to have. The direction in which Dr. Van Woert is working is one that I hope he will continue in until he is able to get pictures so well defined as to leave no doubt as to the conditions of the parts photographed.

Dr. Van Woert. I have here something which I think is of great importance. Parke, Davis & Co. are making for me pellets of cotton in which they incorporate a fixed amount of cocain,—one-fifth and one-tenth of a grain,—in different sizes. This assures you of a fixed dosage and a fresh solution. Simply place a pellet in the cavity and moisten it with water, and proceed in the usual manner.

Dr. Shumway, of Plymouth, Mass., then read the paper of the evening, entitled "With the Doctors."*

John I. Hart, *Editor Odontological Society.*

Union Meeting of the Maryland State Dental Association, Washington City Dental Society, and Virginia State Dental Association.

Second Day—*Evening Session.*

(Continued from page 746.)

Dr. Charles L. Steel, of Richmond, read the report of the Committee on Operative Dentistry, of which an abstract follows:

In the hope of making a report which would be interesting and

*Dr. Shumway's paper was originally prepared for an audience of physicians, and as it deals with dental matters in a popular rather than techni-

instructive to all, the chairman had sent to the members of the committee a number of questions, to which replies were asked. He presented the replies received, together with comments of his own. The first questions were:

"What methods are you using for painless dentistry? Have you tried cataphoresis? What do you think of hypnotism?"

In reply, Dr. R. H. Walker, of Norfolk, recommends "good sharp instruments" as "the most effective obtunder;" has used cataphoresis for some time with "pleasing results," but has not found it a "panacea." Objections to it: time consumed, and inability of patients to stand sufficiently high voltage; he is not satisfied from personal experience whether or not the electric current produces dangerous irritation of the pulp. He "thinks very little of hypnotism in its present state of advancement."

Dr. A. D. Cobey, of Washington, recommends "local anesthetics injected under gum" for extraction. For sensitive dentin relies "with greater confidence upon absolute dryness, supplemented with carbolic acid, cocain hydrochlorid, chloroform, or equal parts of creosote and oil of cloves." Has had no experience with cataphoresis. Regards hypnotism "as an undeveloped science worthy of thoughtful and careful philosophical research."

In propounding this question the chairman did not have in mind painless extraction, because in view of the conservatism of the dentistry of the present day, extraction is a rare operation. The only successful means for painless extraction has been by hypodermic injections of solutions, which have generally been proven to have cocain as their active ingredient, and which, in view of the idiosyncrasies of some persons, are dangerous to use. The pain attendant upon the skillful extraction of a single tooth is too slight to justify either patient or operator in using any known anesthetic; where many teeth are to be extracted the necessary amount of a hypodermic injection is extremely dangerous, and complete anesthesia by chloroform or ether is the only reliable practice.

The question referred more particularly to the relief of the pain from sensitive dentin. For years past the chairman has found it unnecessary to inflict any pain of consequence in extracting. His practice is to remove from the cavity all loose *débris* and as much of the decay as can be without inflicting pain; then some crystals of cocain hydrochlorid are applied to the cavity upon the moistened point of a large excavator. Care must be taken to prevent the diffusion of the cocain into the mouth. First, because its action is lessened if not confined to the desired point; second, to prevent swallowing any portion of the cocain. From one-tenth to one-half grain is the officinal dose, the latter even being a dangerous dose, while one-tenth may promptly evidence its systemic effect. To prevent diffusion, he prefers to apply the rubber dam, but sometimes depends successfully upon sealing

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cal manner, is omitted here owing to the unusual demands upon our space at this time in the publication of the several society reports.—Ed. Dental Cosmos.

the cavity with cotton and sandarac varnish. Usually after a ten minutes' application of the cocain the bulk of the decay can be removed, and then from five to ten minutes of a second application of fresh crystals permits any desired cutting. He has not found any one to claim better results from the cataphoric use of cocain than he has recorded as from the local application of the crystals. Viewed theoretically, cataphoresis seems the best and safest way to use cocain for the relief of pain in extraction, because it ought to more perfectly permeate the tissues desired to be affected, and because it does not so readily enter the general circulation and thereby produce idiosyncratic effects. He also believes that it has a future for the application of other remedies than cocain. Iodism has been produced by the general practitioner by means of cataphoresis most successfully. May we not meet with equally satisfactory results along the same line?

The question regarding hypnotism did not refer to the complete subjection of one person by a second person, so that the former obeys any suggestion of the latter; but rather to what is expressed by telepathy or the *sympathetic control* which all of us exercise to a greater or less degree in our daily practice. How is it that a patient will come to us thoroughly unnerved? how is it that we so frequently get these patients thoroughly in sympathy with us, or, perhaps more truly, we convince them that we are thoroughly in sympathy with them, and they come to their appointments with a smile and submit to pain without undue complaint? Do you not remember that this result has been accomplished at the cost of nervous exhaustion to yourselves; that you feel unnerved and depressed after waiting on such a patient? Not myself a hypnotizer in the extreme meaning of the word, I am convinced that the phenomenon which I have mentioned is a modified form of hypnotism, and since, if we are sympathetic dentists, we involuntarily exert this power, and exert it at the expense of our own nervous force, it behooves us to look into the matter from a scientific standpoint for the benefit both of our patients and ourselves. In my readings on hypnotism I have been struck with the fact that all of its apostles insist that it is necessary to success that the operator should be himself imbued with a beneficent intent, with good physical condition, and with ability to concentrate attention and efforts in a given direction. Quite apart from hypnotism, none of us will deny that the possession of these qualities would be advantageous to us; let us then try to cultivate them.

My second question was, "What are your opinions on the advantages and disadvantages of permanent separations and the 'knuckling' process?" On that question Dr. Walker expresses himself as being totally opposed to permanent separations, the knuckling process being a pattern after nature. We can't often improve on her handiwork if the development has occurred under normal conditions. Dr. Cobey says, "So far as simply arresting decay is concerned, neither method has any advantage;" he practices knuckling, and states as disadvantages of permanent

separations: loss of masticating surface, marring the beauty of incisors, and inviting Riggs's disease. This question occurred to me from examining the mouths of two patients, one of whom had some of that old-time work we sometimes see, teeth cut widely apart and perfect gold fillings inserted, all of which had remained perfect. The other patient had the normal shape of his teeth restored by knuckling. In the mouth of the latter a few operations were beginning to fail, but so evident was the superiority of the result in his mouth over the condition of affairs in that of the first patient that I first thought of asking the question in this way, "Is not even temporary preservation of the entire tooth-shape by the knuckling process preferable to a more permanent preservation of a portion of the tooth by permanent separations?" Now, my standpoint is this: we must secure for our patient the most effective masticating surfaces possible, and we must preserve the anterior teeth as perfectly as possible, having due regard to their esthetic appearance. But I do not believe these results are always best attained by contouring. Dr. Walker is right that we cannot improve upon nature's handiwork if the development has been under normal conditions. But, alas, how often do we see the development "under normal conditions"? In not one patient in a hundred, I venture to say. Theoretically perfect teeth should touch each other at just one point, all remaining portions of the approximated surfaces sloping away from that point; and in such cases the knuckling of fillings against each other restores natural conditions. But in the majority of our patients we find the approximating surfaces bearing against each other throughout their whole extent. In these cases I claim it is irrational to attempt the typical knuckling operation; we do not thus give the patient the type of tooth nature has for reasons of its own seen fit to provide in this particular case, and when we attempt to do so we frequently find our operations uncomfortable to the patient. This is the class of cases in which patients most frequently complain of the pain and annoyance resulting from food packing in the pocket next to the gum. I do not believe in the method of cutting away extensive portions of the tooth and leaving wide interdental spaces; but I do believe in and practice more extensively every day what I term the prophylactic shaping of the teeth. In the anterior teeth I shape the approximal surfaces so that they shall present a bevel from the labio-approximal angle toward the center of the palatal surface; thus the anterior appearance of these teeth is not changed in the slightest, while the inner aspects present open V's which are perfectly self-cleansing. Where much of the anterior surface of the teeth is broken away, frequently a much more esthetic appearance is obtained by leaving some space between the teeth and lessening the extent of our restoration of contour, thus avoiding undue display of gold. The bicuspids and molars I bevel in the same way, and in addition slightly round the edges of the grinding-surface; this gives somewhat the condition of two V's, one opening toward the center of the mouth, and the other on the grinding-surface. The outer or

buccal surfaces are untouched, and the masticating surfaces not materially diminished, while a moment's consideration of the relations of the planes thus constructed will show that no particles of food can possibly be retained in these spaces, but must inevitably slide out into the mouth. It is astonishing how a slight beveling toward the grinding-surface facilitates a view of the approximal surface, thus helping us to insert plain fillings in these positions; for frequently we find decays so small that it would be rank malpractice (in my opinion) to cut them through into the grinding-surface, and yet they must be filled.

The next question I submitted to my committee was, "Do you use non-cohesive gold; if so, why? To which Dr. Walker replies, "Almost entirely. Nearly always finish my fillings with cohesive gold. Think that soft gold can best be adapted to the walls of the cavity," etc. And Dr. Cobey says, "I am a user of non-cohesive gold, and my reason for using it is because in suitable cavities I save time, lessen labor, and on account of its softness and pliancy, by its use a more perfect adaptation to the walls of the cavity is obtained, thus making a more perfect filling." There are two ways of working non-cohesive gold. Those perfect fillings which sometimes come under our notice, put in thirty or forty years ago, were of non-cohesive gold, but inserted on much the same principle as is used with cohesive gold, viz: having fastened a layer of gold in the cavity, the remaining gold was worked into that with sharp-pointed instruments. These fillings were extremely dense, and possessed all the advantages of non-cohesive gold except the saving of time in working. The modern method of working non-cohesive gold is to wedge in large quantities. In some cavities I frequently introduce a whole sheet before condensing. Worked in this way, the filling may not be as dense as a cohesive filling, but it is dense enough to save the tooth for all time, as far as that filling is concerned; and what more can we want? By this method an immense amount of time is saved, and, in view of the nervous strain on patients, it has always been my effort to shorten operations wherever I could do so without injustice to my work. One more point: Some have urged that the surface of a non-cohesive filling cannot be made as hard and dense as one of cohesive, and that this is due to the fact that non-cohesive gold is not chemically pure. But let me assure you that, whether that be true or not, it is sufficiently pure to be amenable to metallurgic laws. If I take a plate of pure gold in my laboratory and persist in burnishing, it will presently become intensely hard; and the same is true of the surface of a non-cohesive filling. It is from a failure to know or to act upon this fact that so many non-cohesive fillings present a pitted appearance after a few years' wear.

My next question was, "Have you ever tried cementing on cast fillings, instead of large cohesive gold contours?" To which Dr. Walker responds he has not tried it, and does not think it durable. And Dr. Cobey says he has not tried it, but should he attempt it would groove out the line between filling and tooth and fill with gold, or posteriorly with gutta-percha. It seems, then,

that, among the three active members of the committee, I am in a decided minority when I say most emphatically that I have put on my last extensive contour of cohesive gold. I shudder to think now of the tortures I have inflicted upon patients in the past, but if those sins be forgiven me, never again will I be guilty of similar offenses. In such cases, now, if the pulp is alive, I drill holes in safe places a little deeper than I used to do for cohesive gold, put pins out of porcelain teeth in these holes, burnish thirty-two gauge pure gold over the surface of the cavity, letting these pins pass through the plate, build upon this plate the proper contour in wax, and dismiss my patient in less than a half-hour, instead of from one to six hours as formerly. In my laboratory I substitute twenty-carat solder for the wax, dress it up nicely, and at a subsequent sitting cement it to its place. Dr. Walker is wrong in his surmise that they are not durable, for from numerous practical cases I can testify that they are enormously strong. Nor need Dr. Cobey concern himself about the intervening space. So perfectly can the soft thin gold be burnished upon the tooth surface that a joint practically does not exist.

My next question was, "Give any points you may think of interest concerning amalgams and possible causes of their failure." To which Dr. Walker says, "Imperfect preparation of cavities;" and Dr. Cobey the same, and in addition imperfect finish. It is unfortunately too true that many are careless in the preparation of their cavities for amalgam, and hence have their fillings fail. Dr. Cobey says our amalgams ought to be squeezed very dry. I take issue with him on this point. A perfect amalgam, and there are a few such, is made from a formula composed of certain *perfectly proportioned* metals. To illustrate, the metallurgist manufacturing the alloy finds that the addition of exactly a certain per cent. of a certain metal checks contraction; the least lessening of the amount will permit or cause contraction; the least increase allows expansion. The mercury we squeeze out brings with it some portions of the alloy, and inasmuch as mercury has greater affinity for some metals than others, it will bring out relatively greater proportions of some metals than others; and the delicate adjustment which the manufacturer has produced is thus broken up and a faulty amalgam is the result. If our amalgam is too soft it would be better to add a little more of the alloy, until the proper consistence is obtained. Again, it is a mistaken idea to suppose that an excess of mercury injures an amalgam as much as is generally thought. Mercury does not affect shrinkage except in excessive quantity; it improves color, and its chief objection is a weakening of the mass, which in unexposed cavities does not much matter; and an objection to working amalgam very stiff in inaccessible cavities is the difficulty of adapting it to the walls. Another cause of amalgam failures is the use of impure mercury. Lead is almost invariably present in native mercury; it is one of the metals most difficult to remove. And when we remember that lead exerts a most injurious effect on amalgams, causing them both to shrink and discolor, we can readily understand the great

importance of perfectly pure mercury. Great stress, too, should be laid upon perfectly polishing our amalgam fillings after they have become quite hard.

My next and last question was, "In view of the perfection of many of the amalgams of the present day, do you not think it a mistake to attempt large and difficult gold fillings in posterior portions of the mouth?" Both gentlemen reply in the affirmative. And Dr. Cobey adds, "In all large cavities in molars and bicuspids where I substitute amalgam for gold, I find great satisfaction in using the amalgam in conjunction with cement, a method, in my humble judgment, which must appeal most strongly to the favorable opinion of all who have tried it. It should always be used in teeth with frail walls. The *modus operandi* is, mix the amalgam after preparing the cavity to be filled thoroughly, fill this cavity with cement while it is in a 'flowing' condition; and as soon as the cement has set sufficiently to offer just a slight resistance to the touch of an instrument, begin to pack small pieces of amalgam in the center of the cement, forcing it in with small-pointed instruments, being careful not to let the instrument penetrate the amalgam far enough to be in contact with cement. As more amalgam is added, use larger instruments, spreading the amalgam until the margins are reached. When the cement has sufficiently hardened to clean away from the margins nicely, clear them of cement and continue the amalgam to a finish. Thus we have a cement lining with amalgam finish."

On motion the discussion of this report was postponed, and the convention adjourned to meet at nine o'clock the next morning.

Third Day—*Morning Session.*

The convention met at nine o'clock; Dr. J. V. Haller, president of the Virginia State Dental Association, in the chair.

Dr. J. L. Wolf, of Washington, read the following paper:

Hygiene for the Dentist.

Hygiene or preventive medicine is that branch of medical science which has for its object the providing of measures against deleterious and destructive agents which by their presence are a constant menace to health.

In the vocation of the dentist subtle causes are constantly at work to the detriment of his health, as evidenced by the fact that of the professions that of dentistry stands near the bottom of the class as regards the average duration of life of its members.

As bearing upon this mortality, it may be that in the works upon hygiene the chapter upon the health of the dentist needs revision, and to that end I ask the indulgence of this assembly in stating in a general way some of the ideas and convictions which have forced themselves upon me after an experience of upward of a third of a century in an active dental practice.

The dentist has his analogy in no other profession. In the performance of his duties he is obliged to exercise by turns much

physical strength and endurance, delicate touch, exquisite skill, ingenuity, keen judgment, ready decision, great patience, and serenity of temper. To secure all these accomplishments and to maintain them at their b st throughout life and unto venerable years, the one great requisite is an early possession and continuance of physical health. And to this end a plan of hygienic measures should be entered upon at the beginning of the professional career. With this object we will first consider the location of the operating chair. A floor above the first story is preferable to one immediately above the ground or over a cellar, as dampness and other noxious effluvia from the earth's surface are apt to find their way into the apartments when low down, thus laying the foundation for such diseases of the system as owe their inception to an unhealthy and poisonous atmosphere. Apartments on the second floor (as well as higher up) have the advantage of more certain immunity from vitiated atmospheric influences, greater quantity of unobstructed light, and a more even temperature.

Sunlight being an important element in hygienic measures, the window through which it enters should be the one the chair should face, although, on account of the more steady light, the northern exposure is usually regarded as the most desirable. This, however, is more a matter of convenience, for as far as the eye is concerned that organ fares as well in a southern as in a northern exposure.

Fresh air is a hygienic measure of great moment to the dentist. Inhaling to some extent as he does for hours the exhalations of the patients' breath, his physical system must eventually feel the effects more or less of an atmosphere which can by no manner of reasoning be called normal; and when we reflect that many of the operations in the mouth are of a laborious character, producing accelerated respiration in the operator, causing him to inhale a greater given quantity of air, we can readily understand why the allotted years of threescore and ten are far beyond reach of so many members of the profession, a great portion of whose active existence is passed in an atmosphere which only in degree differs from that of the famous "black hole" of Calcutta.

Much of the baneful tendency of this vitiated air can be averted by standing frequently at an open window or door during business hours, and with mouth closed and shoulders thrown back gently inflating the lungs two or three times to their full capacity. Exercise, especially in the open air, is a hygienic measure which it is the religious duty of the dentist to incorporate into his daily habits.

Walking is one of the very best of exercises,—ever ready; no preparation for it to be made except to guard against undue exposure.

Horseback riding is a most excellent form of exercise, as besides the quantity of fresh air that is received into the lungs all the other organs are benefited by the motions of the animal, and without unusual exertion of the rider.

A small gymnasium attached to the premises and accessible to fresh air would furnish admirable means of exercise during inclement weather.

Next to these, bicycle riding offers to dentists a means of outdoor exercise, provided it be properly indulged in, avoiding strictly the bent back and stooped shoulders assumed by so many wheelmen, and exercising care against over-exertion, the object being gentle exercise, not fatiguing work, and a good supply of fresh air to the lungs. As in horseback exercise, the bicycle affords a beneficial change of scene and a certain exhilaration always accompanying rapid and easy transit.

Seven hours should be a full day of dental labor, including an hour in the middle of the day for the heavy or principal meal.

Three meals a day in my estimation is the number most conducive to health for the majority of dentists, and the principal meal should occur in the middle of the day for two reasons: first, that the body may maintain uniform vigor throughout the day; second, with our modern cookery there is an inclination to partake of more food than is necessary for the welfare of the system, and if the heavy meal be after the cares of the day the appetite, sharpened by the long interval of rest, notwithstanding the light luncheon between, is prone to over-indulgence, resulting in mental and physical sluggishness, to overcome which a portion of the evening is given up to inactivity and sleep; whereas if the middle of the day were taken for the meal, with the knowledge that important work was yet to follow, requiring clearness of intellect and energies, the impulse to eat to and beyond the point of satiety would be restrained, and after the last meal of the day, which should be in the nature of a light social repast, the entire evening could be given to recreative diversion, this, too, paving the way to the essential eight hours' sleep.

In the matter of diet there should be no necessity for one being prescribed for the dentist. He should be able to partake of everything in moderation, exercising a preference, of course, for that which is nutritious and supplies the waste of the system. A mixed diet is most in harmony with the requirements of health,—fruits with the breakfast and vegetables with the dinner. The beverages, tea, coffee, and chocolate, within bounds, are rather beneficial than otherwise, each individual selecting according to his taste. Sterilized malted milk is a pleasant beverage, mildly invigorating, and useful during the active hours at the chair. Ginger beer and lemonade in hot weather, if taken judiciously, are refreshing and harmless. Unadulterated malted beer quenches thirst and in judicious moderation imparts vigor to exhausted energies. Wines are beneficial to the degree that they are needed for the system, but taken intelligently, judiciously, and in very great moderation need not be productive of harmful results. All these stimulants and tonics should be taken with meals only.

Bathing is a hygienic measure of importance in proportion as it is indulged in with intelligence. Every one must consult his own judgment as to the form of bath best adapted for him. Not every

one can take the cold plunge-bath with impunity, and the tepid or hot bath frequently indulged in is not always beneficial. Surf bathing is invigorating, but by its injudicious and immoderate application very many lose its purely beneficial effects. The tepid sponge-bath, either in the morning upon rising or after the labors of the day, and drying and friction done with a soft towel, is perhaps the form of bath most suited to and safe for the majority of people, especially the dentist.

An occasional vacation, with complete change of air and scene, is a hygienic measure of incalculable value to the dentist; from ten days to a month or more annually, at least, should be given to this very desirable means of recreation.

The foregoing are, after years of active service, some personal reflections upon the subject near to our hearts, and I will venture to say that if the practice of dentistry is strictly pursued along the lines just laid down not only will our work be more full of completeness, but our years will be extended much beyond the autumn time of our existence.

Discussion.

Dr. H. B. Noble said the suggestions in the paper were excellent. He agreed with it in regard to the location of the office and the necessity for sunlight in it. He also thought it necessary that the laboratory should be a large, ventilated, and well-lighted room, for many hours of the dentist's life are spent in the laboratory. He did not agree with Dr. Wolf that the heaviest meal of the day should be eaten at or near noon; thought a light lunch at that time better, as one cannot work so well after a big meal. Six o'clock is the best time for dinner, as more time can be spent at the meal and there is plenty of time for digestion before bedtime. He approved of both horseback and bicycle riding as productive of the condition that will fit us for the best work and that will insure a longer life.

Dr. M. F. Finley agreed that the subject of hygiene was a worthy topic to bring before dental conventions, as the due observance of such rules as are laid down in the paper would add to the comfort and usefulness of life and prolong it to a useful old age.

Dr. T. S. Waters said that his experience had taught him the necessity of caring for his health in his office appointments. He had recently provided himself with an office arranged with this purpose in view, and the change had proved beneficial to him. Had he remained in his old office he did not believe he would have been able to practice at this day. The office he occupies now has six windows and two doors, and is consequently thoroughly lighted and ventilated. In the matter of eating he thought with Dr. Wolf that the heartiest meal should be eaten in the middle of the day, as it kept up the strength needed for the day's work. He began on the plan of having dinner at six o'clock, but found it did not agree with him, and under the advice of a good physi-

cian he changed and had ever since found the mid-day dinner suited him better.

Dr. A. W. SWEENY said that the arrangement of the meals would have to be left to the individual experience of every man. Personally it seemed that the six o'clock dinner was likely to be best for professional men, as then only could they have the leisure required to spend the requisite time at the table and digest the food when the body and mind were at rest. In European countries, where civilization is older, the dinner is invariably taken at the end of the day.

The subject was passed, and the discussion on the report on Operative Dentistry, by Dr. Steel, was taken up.

Dr. D. N. RUST said in regard to cataphoresis, he had a cataphoric apparatus and by its use had got the happiest results, the patients who have sensitive teeth undergoing the operation of excavating and preparing the cavities with absolutely no pain; but still he thinks that cataphoresis is a myth, and that the cocain accomplishes the whole result, and that a saturated solution of cocain would without the cataphoresis render the dentin painless to the same degree. He spoke of a case where a tooth was broken by a blow; he put crystals of cocain with a couple of drops of water on the tooth, and having left it there for about eight minutes removed the pulp. There was no pain until the very end of the root was reached. The cavities where such application, either with or without cataphoresis, is most beneficial are those in extremely sensitive teeth where there is rapid white decay.

He does not think well of cast fillings, though he has seen some successful ones.

The subject was passed, and Dr. H. C. THOMPSON, chairman of the Committee on Dental Education, read the following report:

The committee appointed to report on the progress of education, literature, and nomenclature would respectfully report that the dental profession has cause for congratulation on the fact that the year 1896 has been characterized by great progress made along these lines. We may say that this has been an exceptional year, especially in reference to nomenclature and education. The latter has been under consideration for several years, but there has been a dearth of concerted action on the part of the members of the profession until this year, when it culminated in a report of a committee of the American Dental Association, Dr. S. H. Guilford, chairman, which presented a full tabular report. This report was made only after very much time and labor had been expended, in the way of reprints forwarded to the various dental societies of the country, to be placed under discussion and criticism, but the result of this effort is patent in the thoroughness with which it has been accomplished.

Not only has this great step been an advantage to our profession, but from the report of that committee "it will be seen that medical lexicographers have taken up the matter with a view of placing the list of terms in the various medical dictionaries." Your committee, in view of the length of the report of the com-

mittee of the American Association and the fact that it is published in full in the proceedings, does not consider that it should take up the time of this meeting required to make a report in full. It would recommend that this joint meeting give its full approbation to the work and strive to do all in its power to advance it.

In relation to the advancement of dental education, your committee is indebted to the report of a like committee of the National Association of Dental Faculties, which is as follows:

At the present time there are in active operation colleges and corporations conferring dental degrees, fifty-one; with a few exceptions, all having representative privileges in the National Association of Dental Faculties.

Number of matriculants during 1896.....6212
Number of graduates during 1896.....1446

Your committee would also report that the National Association of Dental Faculties, at its last meeting at Saratoga, in August last, adopted a plan which, if properly carried into effect, will give an impetus to the educational institutions of the country. Up to last year an applicant who presented himself for admission to a dental college was not required to undergo any special examination. While some of the colleges required a somewhat rigid preliminary examination, others were very lax. In other words, the qualification for admission of a student was left to the discretion of the college officials to accept or reject such applicants.

By the plan referred to all colleges are required to have a graded system of preliminary examination, these examinations being extended from year to year, beginning with 1898, in such a manner that at the expiration of the fourth year, 1902, the preliminary standing of a student will be that of a high school graduate.

That this is an advanced step in education no one will dispute; that its effects will be salutary to the profession is equally evident. It will place the standing of the dental colleges on a plane with those of medicine, and will enlist in the ranks of dentistry only educated men, such as it should demand as a branch of the healing art.

Your committee would report that along the line of education, dental literature has kept pace with those departments already mentioned, as is evidenced by the following publications of the year, taken from the official report of Dr. J. M. Lamb, of Washington, D. C.:

Abbott's Dental Pathology and Practice.
Black's Dental Anatomy.
Burchard's Compend of Pathology.
Catching's Compendium for 1895.
Pedley's Diseases of Children's Teeth.
Evans's Artificial Crown- and Bridge-work.
Essig's Mechanical Dentistry.
Flagg and Inglis's Dental Pathology and Therapeutics.
Harris's Principles and Practice.
Mitchell's Dental Chemistry.
Turnbull's Anesthesia.

For 1897:

"A Treatise on Surgery by American Authors," edited by Roswell Park, M.D.

"Notes on the History of Anesthesia," by James McManus, M.D.

Your committee has two papers to offer at this meeting:

One, by Dr. Richard Grady, of Baltimore, Md., entitled "Competitive Examinations for Scholarships in Dental Schools."

One, by Dr. W. A. Montell, of Baltimore, Md., entitled "Dental Education."

Dr. THOMPSON then read the following paper by Dr. MONTELL:

DENTAL EDUCATION.

Dental education is for the purpose of making dentists, and this purpose is what is supposed to animate not only the faculties of the various colleges and the profession, but to render necessary the creation of various governmental supervisors, in the shape of state boards of dental examiners. Dental education may be divided as regards quantity and quality, and under these heads the writer will endeavor to point out what he deems the defects and suggest such remedies as appear feasible.

We will first consider the quantity of education received by students in our institutions; and we will assume so far as the quantity is concerned, that were the pledges made in the catalogues of dental colleges fulfilled the student would be well grounded when his diploma was granted. But is this the fact? Do we not all know that many of the announcements which look so well on paper are but the buncombe of the demagogue who deludes the people with promises never intended for fulfillment? We find on paper an array of "ologies" the mastery of which would entitle any one man to marked position among the scientists of the day, and yet upon investigation of the facilities of the institutions so advertising we find that they have within their walls neither the facilities for teaching nor the pretence of so doing.

Bacteriology, histology, pathology, and chemistry have become recognized as essential to the education of a dentist in our day, and there seems to be a universal disposition on the part both of the profession and the students to demand such instruction in these branches as will enable them to intelligently pursue the practice of dentistry, and this brings us to the second head of dental education, viz: quality.

Do our colleges generally teach these branches in such shape and manner as are suggested by the special needs and requirements of the dentist, or is not the dental student left to drag from the mass of general knowledge on these various subjects such portion as he may suppose will be useful to him? How much better were it that these branches were so specialized that the dental student were taught such portions only as had relevancy and bearing upon his specialty alone, than to be compelled to spend many precious hours in laboratories engaged upon general investigations that, while useful, as all knowledge is, cannot repay him in even the smallest degree so well as special knowledge pertaining to his own profession would. As previously stated, the object of dental education is to create dentists, not men whose widely diversified knowledge

would simply entitle them to be "Jacks of all trades;" therefore, let us not compel our students to waste their money and, what is far more valuable, precious time in acquiring vast stores of disjointed knowledge, having but a remote bearing upon their own chosen specialty. The writer trusts that his views will not be unjustly nor hastily condemned, as he fully appreciates the value of all knowledge; but he does emphatically wish to enter a plea for specialized instruction in such branches of dentistry as are allied to medicine, and he ventures to predict that the day is not far distant when the dental student will demand for himself just such a course of instruction as is herein outlined. It is due to these defects in our system of dental education that it has been found necessary by the profession to establish such a safeguard to its portals as the various state boards of dental examiners, for that supervision so necessary to protect themselves and the public from imposture and incompetency. If it is necessary that a dentist have the same medical knowledge as a general practitioner of that science, then make it a requisite that every matriculant of a dental college obtain first his medical degree; but if, as the writer believes, it is not necessary that he be so instructed, then let such time as he be required to spend in learning the collateral branches be spent upon such portions only of those branches as will assist him to the better understanding of dental science. While dentistry is probably a specialty in medicine, yet it has of its own nature many features independent of that science, though founded more or less upon its principles, and practiced more intelligently through a knowledge of the same. There can be no question that the recognition of these facts has done much to advance the status of dentistry as a profession in the estimation of the masses, but the writer doubts if the results have been the making of better dentists in the practical every-day work of the profession, except in so far as the increased curriculum has demanded of the dental student a higher grade of preliminary education to enable him to comprehend and master the details of the new branches added to his former studies; and while these men may be better equipped so far as the theories and principles of our science are concerned, the writer doubts if in the practical work of dentistry they have advanced proportionately, or rather advanced at all. Has it not been apparent to us all that the ability to intelligently comprehend a new fact is in direct proportion to our training in the line of that fact? And as that fact has bearing upon other facts with which we are conversant already, even so in the study of dentistry facts which have but a remote bearing upon that science are the more difficult of comprehension to the average student, and serve but to distract his mental energies from the study in which he is engaged. But on the other hand each new fact, the relation of which to dentistry is evident to the student, once acquired is but an additional incentive to further study, and renders the acquisition of higher attainments easier and lighter and adds new impetus to his labors.

The writer desires it to be distinctly understood that he has no wish to either lessen the labors of our dental students or to abolish

in any manner the branches which are taught in any of our reputable colleges. But he does desire to bring out two facts of, to him, great importance. He has found from personal experience in teaching that it is necessary for our students to measure up to a higher standard of preliminary educational requirements to comprehend the various laboratory work imposed upon them by the advanced curriculum, and that this advanced curriculum shall be so specialized and crystallized around dentistry that they will see the bearing of each fact when presented in the various laboratories, and grasp its significance and bearing as related to dentistry.

This constitutes no curtailment of their studies, but makes those studies dentistry and not general medicine; and it rests with the profession to accomplish this, by the selection for their students of such colleges as have the facilities and show an honest endeavor to keep their promises made in their announcements.

Let the education of a dental student be a flight of stairs composed of dental facts, and let no fact be presented to him in his study which he is unable to comprehend in its relation to dentistry; and weed from his mental garden all facts whose relation to that science cannot be made manifest and apparent to him.

It is to the young man going out into the field of dentistry to whom the profession looks for the discoveries and advancement of the dental science, and can we expect fruit different from the seed which has been planted in his mind? So let us aim to bestow upon him such knowledge as will be a fair consideration for the money he expends, and which will produce a lasting honor to our profession.

(To be continued.)

Southern Dental Association.

Afternoon Session—August 3, 1897.

*Discussion on Dr. Walker's Paper.**

Dr. Grant Molyneaux, Cincinnati. I have read Dr. Walker's previous papers and I appreciate his motives in the work he is doing in the cause of prosthetic dentistry, but I cannot agree with him on all points. Not having heard this paper, I cannot intelligently discuss it.

What I have recently written myself on the articulation of artificial teeth was sent to the publishers of "Essig's Prosthetic Dentistry" in crude form, and I had no opportunity of revising the proof. I did not know, until it was too late, that my little cut had been left out, and an original illustration of Dr. Walker's placed in the position which he antagonizes. I admire Dr. Walker's efforts, and am willing to apologize for this use of his cut in my article.

I am always totally opposed to any attempt at destruction without a corresponding reconstruction. If he can produce a complete

*See page 789, current issue Dental Cosmos.

system based on the position he has taken, I shall be quite ready to accept and adopt it. Dr. Bonwill has offered us a complete system, and, as you all know, prosthetic dentistry was in great disrepute when he undertook to elevate it to the position of a science by offering to us his anatomical articulator, an instrument which is absolutely correct in the mechanical principles involved. His system is very difficult to fully understand. I spent over it many long nights and many weary days, but when I did understand it I felt that is was absolutely in practical shape. Dr. Bonwill first made it possible to adopt a system in the arrangement of artificial teeth, and enabled us to teach the student by fixed and certain rules. His was the grandest work done in modern years. Dr. Bonwill made the start along this line; give him all the glory. I cannot differ from him, for I have carried out his system a thousand times or more. I would be glad if Dr. Walker could develop something better, but I do not think he has developed his ideas to the perfection of a system. By diagrams and photographs and clinical demonstrations he must, as Dr. Bonwill has done, prove the absoluteness of his claim.

I have adopted Dr. Bonwill's system because as far as I know it is the only system ever perfected. If Dr. Walker brings out anything better I shall be glad to accept it.

Dr. E. P. Beadles, Danville, Va. I for one would be glad if Dr. Walker would state his side of the question clearly, in a few words, and let Dr. Molyneaux state the other side, so that we can see what the difference really is.

Dr. Walker. No one is more ready than I am to give credit to Dr. Bonwill for his pioneer work. His was the first and the only scientific work done in the line of articulating artificial teeth. He first pointed out certain essential conditions, and he devised an apparatus for attaining those conditions. My work has been to carry it out still further, and also to correct certain errors. In the course of my practical work in the laboratory I found that his instrument was not perfect. His anatomical articulator is faulty in that portion of the mechanism which controls the condyle-movement. It is based upon the statement found in all the text-books, —that the movement of the condyle is forward. He accordingly makes his articulator reproduce a forward movement that is parallel with the plane of occlusion, all the cusps of antagonizing molars occupying the same plane, the only one possible in his articulator This is not according to nature, as may be readily proved, for if casts of natural teeth be placed in the Bonwill articulator the incisors cannot be made to strike cutting-edge to cutting-edge; that is, in the position for biting, for the normal up-curve of the plane of occlusion will cause the molars to come in contact first, preventing the incisors from meeting. This is because the normal drop of the ramus in the movement of the lower jaw cannot be reproduced in the Bonwill articulator. If those same casts are placed in my physiological articulator the incisors will touch, as in the act of biting.

The same is true of the grinding position. The cusps on the

grinding side will not meet, being held apart by the cusps on the other side, there being no drop of the ramus.

At the meeting of this association in Atlanta, in November, 1895, when I first showed the model of my physiological articulator, Dr. Bonwill had casts of what he considers a perfect normal denture, mounted in his articulator, demonstrating a beautiful occlusion. I tried to place them in the grinding position, but they would not articulate. I showed that to many of those here present. You know that the bows of the Bonwill articulator are readily removable with the casts mounted. In the form of my articulator that I then presented casts mounted on the Bonwill bows were adjustable in my articulator, the same as in the Bonwill articulator. I asked Dr. Bonwill to let me place those casts in my articulator, mounted as they were on his own bows. He positively refused to allow me to remove them from his articulator, or to remove them himself for the purpose of making the desired demonstration.

I had with me on that occasion, however, casts of as nearly perfect dentures as we usually encounter, and I showed that by setting my articulator at the correct angle for the reproduction of the normal condyle-movement of the individual, the incisors of casts of natural teeth would meet, as in biting, in my articulator, which they would not do when placed in the Bonwill articulator. The same was true for the grinding position.

If casts of natural teeth cannot be placed in position to bite and grind in an articulator, there is something wrong in the machine.

For my articulator I arrange artificial teeth according to nature. For the Bonwill articulator it is necessary to "cut down and round" certain cusps, that the buccal and lingual cusps may articulate on the same plane, which is not nature's plan.

Dr. Quattlebaum. Will Dr. Walker demonstrate what he claims?

Dr. Walker. I will do so with pleasure at the clinics on Thursday.

Dr. W. T. Arrington. For many years I confined myself to the old devices for articulating artificial teeth. When Dr. Bonwill's articulator appeared I tried to study his methods, but the more I studied the less I comprehended. I must say the same of reading Dr. Walker's papers. I am simply mystified. But I will say that from his remarks to-day I am forced to believe that his knowledge of physiology and anatomy, in its application in his articulator, is as far above Dr. Bonwill's as Dr. Bonwill's is above the old fixed plaster articulator.

Dr. J. Y. Crawford, Nashville, Tenn. I rise to speak in commendation of the work of Dr. Walker. Some things that have been said on this subject remind me of a certain old practitioner who boasted that in six weeks he had made sixteen sets of teeth and never saw an articulator! There are others who think it does not make much difference which side up you use an articulator; the upper model in the lower half will do just as well as any other way! We are still fighting the battle I engaged in eighteen

years ago, when I urged the importance of a knowledge of anatomy applied to the articulation of artificial teeth.

As to the dispute between Dr. Bonwill and Dr. Walker and the merits of their respective articulators, I regard the labor and work of Dr. Bonwill as very valuable, but if there is anything in the statements and claims made, Dr. Bonwill's articulator will not stand the test. Dr. Walker has made a point on Dr. Bonwill in the reproduction of the movements of the lower jaw as it sweeps downward as well as forward, a movement in some cases more marked, it is true, than in others. In some people it is exaggerated; a very considerable downward glide causing a marked modification of the occlusal line and difference in the parallelism of the planes of occlusion and of condyle-movement. In other cases there is but a very slight variation from the horizontal plane; it may be even a perfectly straight line. When the downward movement is greater the curvature of the line of occlusion is greater also. If there is anything in Dr. Bonwill's claim for the necessity of an anatomical articulator, there is far greater necessity for Dr. Walker' physiological articulator, for it is essential that we should be able to reproduce the exact movements of the lower jaw in order to secure three points of contact simultaneously, at the three angles of a triangle. Fifteen, sixteen, or eighteen years ago I attempted to demonstrate that the success of an artificial denture depended entirely upon the correctness of articulation and occlusion. If an artificial denture is supported in the mouth, in the position for mastication, at the three points of an equilateral triangle, it will not be disarranged during the process of mastication. If Dr. Bonwill and Dr. Walker conjointly have accomplished that feat they will have lifted prosthetic dentistry from the slums into which it has fallen. They will have rescued dental prosthetics from the position of an incubus upon the profession.

Dr. J. D. Patterson, Kansas City. There is one point which has not been touched upon, and it is an important one. In my operations I use the Bonwill articulator, not for its movements, but because I can see it from behind and see the position of the cusps. When I try the piece in the mouth, if the antagonism of the natural or the artificial teeth is not what I want, it is easily altered. Experience has taught me that no two persons have the jaw movements the same, and that people well along in years—and they are the ones for whom we construct the most of our full dentures—have acquired new movements of the jaw as they have lost one tooth after another. They have learned to close the jaws, in order to obtain contact of remaining teeth, in a way which was not originally natural, but which has in many cases become second nature.

They make movements not in accord with the anatomy of the parts; a faulty movement perhaps, but an acquired habit which you would try in vain to break up. To accommodate this place the teeth on a base-plate which can be softened by heat and made to articulate to suit each individual, and then you have got it. But no articulator will do it. Let the patient make his own acquired movement, and you will find that you will have gotten over many

difficulties. But do not attempt to make all your dentures anatomically perfect, especially for patients advancing in years.

Dr. MOLYNEAUX. What does Dr. Patterson understand by "anatomically perfect?"

Dr. PATTERSON. Drs. Walker and Bonwill attempt in their articulators to reproduce the normal physiological action. Now, every patient that we have to work for differs from every other one in this respect; we must have a different action for each individual; from years of usage in some special method they will not articulate as you would like them to do.

Dr. J. Y. CRAWFORD. It is absolutely the duty of every dentist who constructs a full upper and lower denture to give it a perfect occlusion and a serviceable articulation. But notwithstanding all that has been said and done, it is the experience of the whole profession that however perfect it may appear in the best articulator now at command there is always something to be corrected and perfected before final construction.

Dr. MOLYNEAUX. It is difficult to make this matter clear without the aid of diagrams that all could see. What do we understand by the physiological articulation of the natural teeth, or of artificial teeth? Is it the same at eighty as at eighteen?

Dr. Bonwill never intended to convey the idea that the relation between the over-bite and the curvature of the line of occlusion was the same in every case. Conditions are greatly modified by advancing age. When there is a protruding lower jaw there is no over-bite, and it would not be either anatomically or physiologically correct to give an artificial over-bite in such a case; the same is true of cases where the incisor teeth meet edge to edge. A patient with normal relations between the upper and lower teeth will have a given over-bite in early life and even into middle age, as exemplified by Dr. Bonwill, and this can be carried out in his articulator the same as in the mouth. I deny that in Dr. Bonwill's articulator the lower jaw does not pass downward and outward exactly as does the natural jaw. There is a peculiar arrangement of the joint of Dr. Bonwill's articulator that permits a perfect reproduction of all the natural movements. All imitations of or attempts to improve upon Dr. Bonwill's articulator have been failures. In Dr. Bonwill's articulators, made according to his own design, the sliding ring is made of round wire which permits of correct movements. In some so-called Bonwill articulators, made by different manufacturers, this ring is made of square wire, interfering with the correct movements. No articulator can ever be made that will exactly reproduce the glenoid fossa with all its tissues and integuments. But one can be so constructed that the essential movements of the lower jaw in their relation to incisive action and contact of the cusps can be reproduced. I had one of the first Bonwill articulators that ever came out. I worked very hard, and, I will admit, almost despairingly, in trying to get it to work right; but all at once it came to me, and I now unhesitatingly pronounce it the greatest boon ever bestowed upon prosthetic dentistry. I repeat that the statement that the Bonwill articulator

cannot reproduce all the essential movements of the jaw is not true. What regulates the articulation of the natural teeth? (Dr. Molyneaux draws upon the blackboard illustrations of the over-bite, molar cusps, sulci, the glenoid fossa, and condyle, indicating the bursæ, intra-articular cartilage, etc.) There are various subsidiary movements of the jaw and positions into which it can be forced by virtue of the yielding character of some of the tissues, but we are not concerned with these. What we want is to be enabled to construct an artificial denture that will not be displaced in the natural movements of mastication. The Bonwill articulator does reproduce all the movements that are necessary to let the incisor teeth pass freely with proper contact of the cusps of the molar teeth. It would be as unphysiological to give the over-bite of youth to old people as to make the incisors of young people meet on edge. An artificial denture must reproduce what is natural to the age of the patient.

All that is necessary with the Bonwill articulator is to get the bite properly. It is not necessary to fit it in the mouth, though it may be returned to the mouth for artistic effects, twisting a tooth a little here, spacing a little there, etc., but not for the articulation. The essential point is to make the artificial teeth as natural to the age of the patient as the natural teeth would be.

Dr. Arrington. If a patient, having reached advanced age, has lost the upper teeth, and the lower teeth are badly worn away, would you restore that? Would you not give any overlap?

Dr. Molyneaux. I have discussed that point in "Essig's Prosthetic Dentistry." In addition to Dr. Bonwill's rules, allowance must be made for the changes natural to advancing age. I repeat, Dr. Bonwill's articulator does move forward and downward at the same time. I have no desire to antagonize Dr. Walker. I would be glad to have him show us a better way, but I do not think he has proved his position yet. Dr. Bonwill's method is based on a complete system, which is always the road to advancement. If you have the correct bite you will always get perfect results, with three points of contact for the incisive function with contact in the molar regions. If you want to give the over-bite you must give the natural over-bite with the corresponding curvature of the line of occlusion. The amount of over-bite regulates the angle. When Dr. Walker's papers appeared I read them several times. I tried the articulator as described. I worked in the dissecting-room; I made experiments in the laboratory, but it was useless; you can't get anything that will work automatically any more than you can digest food in an artificial stomach. You must allow for the changes in the glenoid fossa that come with age.

Dr. Bonwill's is the only perfect system ever given to the world. There should be no work of destruction until we are fully prepared to reconstruct. I shall still continue to follow Dr. Bonwill's system, but I will be the first to adopt Dr. Walker's when he gives us a better one.

Dr. Walker (to close the discussion). I only wish to say that I quite agree with Dr. Molyneaux that it is neither possible nor

necessary to reproduce the glenoid fossa with its synovial sac, intra-articular cartilage, etc.; neither is it necessary to reproduce all the subsidiary movements of the lower jaw. But what we do need is to ascertain the condyle-movement in order to reproduce the habitual jaw-movements of the patient in hand. It is interesting, from a scientific point of view, to know what is the normal movement of the jaw in a person with normally articulated teeth, but as such cases are the exception rather than the rule, the important thing is to be able to reproduce the movements of the jaw which the patient habitually makes, and to be enabled to so arrange artificial teeth that they will articulate in accordance with those movements.

It is true there are some people, and we have all met with them, to our despair, in our practice, who, in losing the natural teeth, have lost control of the muscles which regulate the movements of the jaw; who cannot bite twice alike. In such cases a knowledge of the laws governing the movements of the jaw is invaluable. With correct measurements we can so articulate the teeth that they will guide the jaw in its movements, enabling the patient to recover control of the muscles. The object of the physiological articulator is not to secure the correct normal or anatomical condition of a perfect denture, but to reproduce the habitual movements proper to the age and condition of the patient. As to articulating the teeth in the mouth, I would rather let Dr. Patterson do that than do it myself. For my own use I prefer an articulator from which I know when the articulation is correct. If it is not right in the mouth, my articulator shows me how to correct it,—provided always that the condyle-movement has been correctly registered and a correct bite taken. As to the construction of the Bonwill articulator, I will only say that I have handled a great many of them, getting them from different dealers, but I have never seen one with the sliding ring made of square wire. It is always a round wire, with the part controlling the condyle-movement at right angles with the ramus, and therefore parallel with the bars that hold the casts. I have purchased them in various places, and I have always found them all alike.

A gentleman here—Dr. Quattlebaum—has just told me that he went directly to Dr. Bonwill for one of his articulators, to be sure that it had no defect, and that it was just as I have described it,—with a round wire sliding ring and the two parts at right angles.

(Dr. Walker here illustrated upon the blackboard the points he desired to make clear, the parallelism of the condyle-bar and the cast bars, etc.)

I will only say, in conclusion, that I fail to see wherein I have failed to reconstruct anything that I may have destroyed.

(To be continued.)

Pennsylvania State Dental Society.

The twenty-ninth annual meeting of the Pennsylvania State Dental Society was held at Glen Summit on July 6, 7, and 8, 1897.

Owing to the temporary illness of the president, Dr. H. Newton Young, of Wilkes-Barre, the meeting was called to order by First Vice-President Dr. Wilbur F. Litch, of Philadelphia, on Tuesday, July 6, at 11.00 o'clock A.M. After an invocation by Rev. Dr. Sloan, the society proceeded with routine business, which, with the exception of an address of welcome by Hon. Judge Woodward, of the Luzerne bar, occupied the remaining hours of the morning session. At the afternoon session, with Vice-President Litch again presiding, and after the further transaction of routine business, the president, Dr. Young, read his annual address, which was an earnest plea for a higher professional educational status, a more active support of dental society work, and a general leveling upward toward the requirements demanded by a more enlightened public estimation of the possibilities of dentistry.

In discussion of the president's address, Dr. Darby called attention to the work being done by the Dental Protective Association, and held that, as each member of the dental profession participated directly in its beneficent effects, it was the bounden duty, as it was the justice due of one man to another, of all members of the profession to contribute to its support.

Dr. E. P. Kremer, Lebanon, cited unprofessional advertising, and especially the publication of the advertisements of professional writers of advertisements for dentists, as a flagrant breach of the letter and spirit of the Code of Ethics, and commended the recent action of the American Academy of Dental Science condemnatory of that class of advertisements.

Dr. Truman, Philadelphia, drew a sharp distinction between the class of advertisements which had been condemned by the Academy, and which were clearly unethical, and that other class of advertisements of instruments, appliances, etc., which were educational in character, legitimate in motive, and therefore clearly ethical. He deprecated the spirit of narrowness which could not understand that there was a legitimate commercial side to dentistry as well as a professional side.

Dr. H. W. Arthur, Pittsburg, then read a paper, entitled "When, Where, and How to Use Anchor Screws."*

Discussion.

Dr. H. C. Register, Philadelphia. In former years I made considerable use of screws for anchoring fillings, but lately I have about discarded them altogether, as much because of a change in my methods of operating as from lack of confidence in their use. I found from some of my observations upon the use of screws for retaining fillings, that one must be very particular as to where a screw is placed in the tooth in order to avoid doing harm rather than good. I found that in the majority of cases screws were

*Dr. Arthur's paper appears at p. 810, this issue.

placed in that portion of the tooth just at the junction of the enamel and the dentin, at the stratum granulosum. Now, since I have seen Dr. Williams's photo-micrographs, it has been made clear to me why so many of my fillings failed where screws had been used.

I found in several cases that the screws had been placed at the border of the stratum granulosum and in contact with the inner ends of the enamel-rods, causing a break or imperfection, resulting in leakage, and that caries had followed the screws in the direction of the stratum granulosum, causing a break-down to occur very much quicker than under ordinary methods. And then again, it is very difficult to place a screw so as to obtain perfect anchorage, other than in one or two positions, without placing it too near the pulp. For proper anchorage it must go into the dentin alone. Further, I have found it difficult to pack gold with any positiveness around the thread without consuming a great deal of time or loosening the screw. To obviate this, however, I have used a wire on which I simply turn a short thread and let the remaining part be perfectly plain or square, which very much facilitates the packing process. Of late years I have used screws almost exclusively in connection with amalgam work; there are occasions now and then where I use them to anchor an amalgam crown, or a large piece of work of that character where I know I can get a perfect anchorage in the dentin without having to deal with a vital pulp; it is only in such cases that I am now using screws at all.

Dr. S. H. GUILFORD, Philadelphia. I used screws in connection with fillings for a number of years after they were first introduced to the profession, and I thought with a great deal of success, certainly with much satisfaction, but I found after a while that there were objections to their use. One was the difficulty in inserting screws just where they were most needed. It was difficult to pack the gold closely around the screw, and there was danger of hammering a screw loose; but the greatest objection lay in the fact that after the screw was placed the life of the pulp was endangered, because when you drill a hole deep enough to place a screw in, the bottom of the hole is nearer the pulp than the starting pit would be. If the screw-anchorage is shallow there is danger of its loosening; for these reasons the use of the screw in the living tooth fell into disuse many years ago. There are cases undoubtedly where screws can be used advantageously. I remember a typical case where there was extensive erosion on the occlusal surface of a molar; there was no sign of decay, but the tooth did not meet its antagonist. By inserting three screws at different points in the dentin the tooth was built down so as to properly occlude. In certain cases it will be found that there is little space between the enamel and the pulp in placing a screw; in such cases if placed too near the enamel it is liable to break away, or if in the opposite direction there is danger of involving the pulp, and for the several reasons given I have not used screws in teeth with living pulps. I do use them and value them very highly in cases where the pulp has been devitalized; in fact, the last operation I per-

formed before leaving my office yesterday was one where only the buccal wall of an upper molar was standing. I inserted a How screw-post in the palatal root, put a metal band around the root, and built it to contour with amalgam. The screw-post well placed in such a case affords all needed support and anchorage. I use them continually in pulp-canals, but I do not see a case once in five years where I think screws could be used advantageously in a tooth with a living pulp.

Dr. C. S. Beck, Wilkes-Barre. I am not very much in favor of screws. I never use them unless it be in connection with a pulpless tooth. There is danger of fracture of the enamel or of devitalizing the pulp. Sometimes when I want to build up a root or put on a crown, I insert a heavy screw in the pulp-chamber and build around it with amalgam, but I think it takes a great deal of skill and a great deal of ingenuity to successfully insert a screw where a pulp is alive.

Dr. James Truman, Philadelphia. I want to say a word in defense of screws. The discussion seems to be all one-sided and in opposition to their use. My view is that where screws are required they should be used. I cannot see how it is possible for some operations to be performed without them. I am aware, however, that the dental profession does not view them with favor.

The idea has been expressed here that they will destroy the pulp by thermal action. This view is not sustained by my experience, and I cannot understand why this should occur more with screws than with the filling. A screw properly placed between the pulp and the periphery of the dentin is no more likely to produce thermal irritation than the main body of a filling.

Then, again, there are cases where it is absolutely impossible to build up a filling without the use of screws. The mallet, with proper skill in its use, should not dislodge a screw.

Screws have always had a place with me, both in building up a tooth and otherwise. If the screws be inserted, as Dr. Register says, in the stratum granulosum, it would, of course, result in failure. I do not know, histologically, that there is any such tissue to interfere. The dentin or the tubes of the dentin extend closely to the enamel, and it would not be advisable to place a screw so near the periphery of the dentin.

All things that have been introduced into the dental profession, of whatever character, have all had their use, and it seems to me it is a great mistake in dentists to entirely abandon them as of no further use. Men in the early days of dentistry knew what they were about just as well as those in the present. When screws were first introduced as an aid in filling they were imperfect, being too fine, as the Mack screw, and not well adapted to the work demanded of them.

If the screw is to be condemned upon the recognized principle of thermal action, then dentists must abandon the use of gold foil as a material for filling teeth. This, it is presumed, they are not prepared to do.

Dr. Guilford. I am very much surprised that Dr. Truman

cannot see the difference between thermal effects produced by the use of a screw, and by gold packed into retaining points. He will certainly recognize the fact, which every operator who has used screws extensively fully understands, that a very small or shallow pit will be a sufficient anchorage for a filling, but it does not go as deep, and does not contain as much gold as a properly anchored screw. It is a fact that the screw goes down deeper and nearer to the pulp. Has he not seen teeth with the pulps destroyed, as the result of making the anchorages a little deeper than we make them now? I have. If gold in the starting-point would do it the screw would be more likely to do it, because it goes deeper and is larger in diameter.

Dr. Truman spoke of the imperfect manufacture of the early screws. That matter has been improved, but it does not do away with the fact that screws are objectionable in many cases.

In the early days screws were cut with a fine thread on them. They were very perfect, but very fine, the number of threads being proportioned to the diameter of the screw. Nowadays we are furnished with a screw having a coarse and decided thread, which is much superior to the earlier ones. They are not cut with a screw-plate nor on a lathe, but the wire is placed between two hardened and grooved steel plates, and these are rolled over one another, under pressure, forcing the thread upon the wire. In no other way that we know of could so coarse a thread be made upon a wire without bending or weakening it.

Dr. Arthur. I simply wish to say that my faith has not been shaken in the use of screws by anything that has been said here, and I anticipated in my paper every point that has been raised.

With regard to what Dr. Register said, I think if you will read the paper carefully you will find I laid great stress on the point where I put the screw, and I laid stress upon using it in the anterior teeth and where you can get a good body of tooth on the lingual surface or lingual angle; you can get a great body of tooth there and you don't go anywhere near the pulp, and you don't go near the enamel margin at all; so that objection I don't think holds at all.

With regard to what Dr. Guilford said, to do as he says, you have to cut a great body of the tooth away, and you leave a great body of filling there, subjecting the tooth to greater thermal changes than we make by the small opening for the screw. I think I said in my paper that a great many fail in the use of screws and then abandon them because they have not accomplished their end, and then they are ready to discard screws. I don't want to say that with regard to those who spoke, but of those others who have now abandoned them because they did not answer their purpose; so I have emphasized the care that I think is necessary to accomplish good results.

My faith in screws was brought about by the use of the old Mack screws. I remember probably the first case in which I used them was a lateral incisor. The incisal angle was entirely gone. The tooth had been filled, and it was preserving the tooth, but I thought it looked very unsightly and I didn't see any other way. I used

one of Mack's screws and placed it just at the point I have specified. In putting in that filling the bite was such that it bit into the tooth, making an angle, so that when I saw the filling a short time after the patient had worn it out until it was clear up to the tooth surface and had worn a shoulder into the filling, and still it was in place. I say that is one of the reasons probably that I have had great faith in screws, and have been persistent in the use of them.

I am glad to have heard what others think about them, because I have never yet heard what the objections were. Of course, one has to take some risk, but the risk I think is nothing to be compared with the advantages of their use, because we must take risks even in all ordinary methods.

(To be continued.)

Correction.

In our report of the meeting of the Seventh District Dental Society of New York, published in our September issue, Dr. J. Wright Beach, by a clerical error, is made a resident of Rochester instead of Buffalo. We make this correction at his request.

DENTAL SOCIETY ANNOUNCEMENTS.

State Board of Dental Examiners of Pennsylvania.

On September 8 the Governor of Pennsylvania appointed the following to constitute the Board of Dental Examiners of Pennsylvania under the new dental law enacted by the recent Legislature:

To serve one year—Dr. Henry Gerhart, Lewisburg, and Dr. Jesse C. Green, West Chester. To serve two years—Dr. G. W. Klump, Williamsport, and Dr. J. A. Libbey, of Pittsburg. To serve three years—Dr. C. V. Kratzer, Reading, and Dr. Howard E. Roberts, Philadelphia.

Massachusetts Board of Registration in Dentistry.

A meeting of the Massachusetts Board of Registration in Dentistry will be held in Boston, Monday, November 15, 1897.

Application should be made at once to the secretary,

E. V. McLeod,
New Bedford, Mass.

Northern Illinois Dental Society.

The tenth annual meeting of the Northern Illinois Dental Society will be held at Rockford, October 20 and 21, 1897. A good programme is in the course of preparation, and the profession generally is invited to attend.

Louis Ottofy, *Chairman Ex. Com.*
J. W. Cormany, *Secretary.*

Northeastern Dental Association.

The third annual meeting of the Northeastern Dental Association will be held in Boston, Mass., "Warren Chambers," Boylston street, Wednesday and Thursday, October 20 and 21, 1897. A grand meeting is assured. Please remember the dates. Programs will be sent about two weeks before the meeting.

Edgar O. Kinsman, *Secretary,*
Cambridge, Mass.

EDITORIAL.

More Chloroform Fatalities.

We have on several occasions called attention to the dangers of chloroform when used as an anesthetic for tooth extraction, and we again do so for the reason that there still appears to be need for raising a warning voice against its use for that purpose. This would seem to be unnecessary in view of all that has been written and taught upon the subject, and especially in view of the numerous fatalities which have been caused by it, but notwithstanding the general condemnation of chloroform as a dental anesthetic it is still so employed, and the roll of fatalities is being steadily increased.

It has been stated, and perhaps with some degree of scientific authority, that chloroform as an anesthetic in dental practice is peculiarly dangerous by reason of the more or less upright position of the patient during dental operations, which brings the increased stress of gravity to bear upon a heart muscle weakened by chloroform; a condition not so apt to occur in the case of larger operations where the patient is anesthetized in a recumbent or prone position. We know of no comparative statistics on that point, nor that there has actually been shown to be a greater danger attending the use of chloroform in dental than in general surgical practice. But that is not the point of first importance. What has been shown by statistics and emphasized by carefully conducted experiments is that chloroform may suddenly bring about paralysis of the heart's function and fatal syncope. If cocain had been shown to be as poisonous a drug in dental practice as chloroform, measured by the fatalities resulting from its use, it would have been generally abandoned by the dental profession. But for some unaccountable reason; ignorance, carelessness, habit or otherwise, the reports of fatal chloroform poisoning come regularly along, and the coroner's jury continues to exonerate the participants in the crime with the same inconsiderate disregard of their responsibility for the destruction of human life. The *Dental Record* (London), September issue, contains circumstantial accounts of

two fatal cases of chloroform syncope as shown by the evidence brought out at the coroner's inquest in each case: one that of a young man, seventeen years of age, who had chloroform administered for the removal of "half a dozen stumps of teeth." Death occurred during the operation. "The coroner said this was the second case within a few days that he had held. It was a wonderful thing that there were not more deaths. The jury returned a verdict of death from misadventure."

In the same journal appears the report of another inquest in the case of a woman, twenty-nine years of age, who died while having three teeth extracted during chloroform narcosis. The report states, "There was nothing in the condition of the patient to suggest any danger whatever. She was apparently a strong woman." Death occurred suddenly during the operation. "The patient became blue in the face and ceased breathing, and to all intents and purposes was dead in three or four minutes." The physician who administered the anesthetic testified that "it was quite a usual thing to administer chloroform in cases of dental surgery which occupied some time, and chloroform was as safe as any other anesthetic. Death was probably due in this case to failure of the heart's action." As death and heart failure in this case seem to have occurred simultaneously it would perhaps be almost warrantable to say that the heart failure was due to death, but if we are to accept as correct the reported testimony of the physician it indicates on his part either a culpable ignorance of the history of chloroform poisoning, or else an attempt to shield himself from a grave responsibility by willfully perverting the truth. The *dénouement* of the inquest in this case is, in the light of the present status of chloroform as an anesthetic, grimly humorous, and we quote the closing paragraphs of the report *verbatim*. "The coroner, in summing up, said he did not think, from the evidence, there was any blame attached to either the operator or the doctor. There was always a certain risk in cases where anesthetics were applied, and unfortunately this case was one of those where that risk had had fatal results. The jury returned a verdict of 'death from misadventure,' and expressed the unanimous opinion that no blame was attached to the medical man who administered the anesthetic. They also expressed their deep sympathy with the family of the deceased in their bereavement."

We gravely doubt whether an American jury would have dealt so leniently in a case of similar character, or whether the bereaved family would have been satisfied with such a verdict, even though a resolution of sympathy were appended to it, had the case oc-

curred on this side of the Atlantic. Why English practitioners will stubbornly continue the use of so dangerous an agent when records of its fatalities form part of nearly every issue of their periodical medical and dental literature is beyond comprehension. Surely human life is valued as highly by our British brethren as it is here, and their study of anesthetic agents and their effects as well as practical use has been as extended and thorough as it has been here. But chloroform with all of its risks to life is still the popular anesthetic in England, and as a consequence the harvest of victims still goes on. No better indication of the place which chloroform holds in relation to the surgical practice of Great Britain is needed than is shown by the fact that at least two of the prominent dental educational institutions of the country have on their staff of instructors specialists in the administration of the anesthetic who are designated "chloroformists."

Fortunately the truth is beginning to shed its light into some of the English darkness on this subject, and it is a fact of hopeful significance that one of the best authorities in England on anesthetics has unqualifiedly condemned the use of chloroform in dental surgery as unsafe, and it is to be hoped that among other good things done and to be accomplished by the London Society of Anesthetists this question may be further agitated until the use of chloroform is abandoned and the safer and equally efficient anesthetics, ether and nitrous oxid, are generally and wholly substituted for it.

BIBLIOGRAPHICAL.

THE AMERICAN TEXT-BOOK OF OPERATIVE DENTISTRY. In contributions by eminent American Authorities. Edited by EDWARD C. KIRK, D.D.S., Professor of Clinical Dentistry, University of Pennsylvania, Department of Dentistry. In one very handsome octavo volume of 699 pages, with 751 engravings. Cloth, $5.50; leather, $6.50 (net). Lea Brothers & Co., Publishers, Philadelphia and New York.

The reviewer's life would be a far happier one were he called upon to pass critical judgment only on works of such excellence as this latest addition to dental text-books. In all respects it is a thoroughly admirable work, not, of course, entirely free from imperfections, but one which gives to the dental student, and in a form at once available, concise, and intelligible, the information he needs regarding the principles and practice of the operative dentistry of to-day.

As it is a companion work to "The American Text-Book of Prosthetic Dentistry," recently published, its field is limited to the sphere of operative dentistry. Exception can hardly be taken to the line of demarcation which has been drawn through the somewhat hazy and illy-defined borderland between the two branches. Strictly speaking, all restorations or replacements of dental tissue are prosthetic, but the editor has wisely restricted that term to those operations in which laboratory processes are indispensable; hence, from the present volume crown- and bridge-work, although largely operative, is excluded, while orthodontia, although often, perhaps generally, requiring the aid of laboratory processes, is included.

Did not the exigencies of space absolutely interdict indulgence in that pleasure, the writer would be almost irresistibly impelled to give some detailed account of the good things this book contains; but, as it is a feast to which all are invited, let the *menu* speak for itself.

The twenty-five chapters of the work deal with the following topics:

The Microscopic Anatomy of the Human Teeth,
The Embryology and Histology of the Dental Tissues,
The Examination of Teeth Preliminary to Operation,
Preliminary Preparation of the Teeth,
Preliminary Preparation of Cavities, Obtundents, etc.,
Preparation of Cavities for Filling,
Exclusion of Moisture,
Selection of Filling-Materials,
Treatment of Fillings with Respect to Contour,
The Filling of Cavities with Metallic Foils,
Plastic Fillings,
Combination Fillings,
Inlays,
The Conservative Treatment of the Dental Pulp,
The Treatment and Filling of Root-Canals,
Dento-Alveolar Abscess,
Pyorrhea Alveolaris,
Discolored Teeth and Their Treatment,
Extraction of Teeth,
Extraction of Teeth under Nitrous Oxid Anesthesia,
Local Anesthetics and Tooth Extraction,
Plantation of Teeth,
Management of the Deciduous Teeth,
Orthodontia Exclusively as an Operative Procedure.
The Development of Esthetic Facial Contours.

These topics are treated by the following authors: R. R. Andrews, H. H. Burchard, Calvin S. Case, W. E. Christensen, Dwight M. Clapp, M. H. Cryer, Edwin T. Darby, Clark L. Goddard, S. H. Guilford, Louis Jack, Edward C. Kirk, Louis Ottofy, C. N. Peirce, J. D. Thomas, and Alton Howard Thompson.

Each of these fifteen contributors has presented his subject with

conscientious care, and, while the subdivision of subjects has been carried to a point which might seem to imperil harmony and unity of treatment, it cannot be said that these qualities have not been successfully conserved; the instances of omission or of duplication of matter, or of conflicting statements as to points of practice, are surprisingly few; a result attainable only by the most vigilant and painstaking editorial supervision.

In this connection, it is a pleasure to note that the editor acknowledges in a few graceful and generous words his "grateful appreciation of the assistance rendered by Prof. H. H. Burchard, who, from the inception to the completion of the work, in all its phases, has by wise counsel, intelligent criticism, and skilled effort, largely contributed to the attainment of whatever excellence it may be found to possess." This tribute is all the more worthy of its author because instances are not lacking in dental literature in which similar service has gone entirely unrecognized.

As every writer and editor knows to his sorrow, no book is without faults, and it would seem to be a part of the reviewer's duty to soothe the authorial and editorial breast, and at the same time exploit his own critical acumen, by holding up upon his pen-point a few impaled specimens. In pursuance of this conventional obligation, would it be deemed hypercriticism to suggest that the term "round square" as applied to the round*ed* square of the dental arch of the bilious temperament, is hardly felicitous? The assumed existence of that impossible geometric form in the human jaw irresistibly suggests the thought that another miracle in bone has been wrought, far surpassing that evolved from certain maxillary triangles to which such mystic significance has been attached.

A faulty cross reference is found on page 376, where, for the treatment of acute alveolar inflammation, the student is referred to Chapter XVII, which is a treatise on pyorrhea alveolaris. Chapter XV, page 362, is probably the intended reference.

While the chapters devoted to a description of the physical properties of various filling materials, and the manner of their employment, are among the most valuable in the book, the writer fails to find in them or in the index any reference to the electrochemical relations of such materials to enamel and dentin. Certainly this phase of scientific dental research has not lost its significance or importance, and the dental student should be informed as to what progress has been made in arriving at a knowledge of the principles which, under the varying conditions found in the mouth, determine the compatibility or non-compatibility of stoppings with tooth-structure.

The sealing of ethereal twenty-five per cent. solution of hydrogen dioxid in a pulp-chamber for bleaching purposes, as recommended in certain contingencies, on page 436, has, in the writer's experience, always resulted in a painful pericemental irritation of ten or twelve hours' duration. This condition has, however, never been followed by permanently injurious results. When the apical foramen and the greater portion of the pulp-canal are carefully closed the practice is perhaps permissible, but the student should be warned as to its possible dangers in susceptible cases.

Here and there in the work sentences may be met with which, for syntactical, if not for grammatical reasons, much need remodeling, but knowing how the editorial eye sometimes grows weary, and how writers often hug to their heart of hearts their most faultily constructed literary offspring, and, like the mothers of deformed children, bitterly resent the slightest intimation that they lack perfect comeliness, the present writer prefers to draw over such blemishes the veil of sympathetic silence.

As regards the mechanical execution of the book, its typography, illustrations, paper, and binding, he must indeed be exacting who demands better work. The type is particularly clear, large, and well spaced, and in the furnishing of illustrations, so expensive an item in a work of this character, Lea Brothers & Co. have acted with their accustomed liberality.

As fittingly applicable to the publication of dental works by this firm, may be paraphrased the remark of one of Bulwer's characters, "They do not often do these things, but when they do they do them handsomely." WILBUR F. LITCH.

A MANUAL OF THE INJURIES AND SURGICAL DISEASES OF THE FACE, MOUTH, AND JAWS. By JOHN SAYRE MARSHALL, M.D. (Syra. Univ.), Former Professor of Dental Pathology and Oral Surgery and Emeritus Professor of Oral Surgery of the Dental Department of Northwestern University, etc. Octavo. Pp. 732. 364 Illustrations. Price, cloth, $6.00 net; sheep, $7.00 net. Philadelphia: The S. S. White Dental Manufacturing Co., publishers, 1897.

A fair and just review of any work must take as a first consideration the statement of the author of the work as to what his book purports to be. Dr. Marshall terms his work a manual, implying that he presents it as something less than a general treatise, and still less as an exhaustive work upon the subject of this special regional surgery. The author is too modest in his title, for the book, no matter how labeled, is distinctly more than a manual.

Perhaps one of the first features which will strike the reader's attention will be the series of formulated questions at the end of each chapter upon the subject-matter of the preceding text. This indicates that the work is especially designed for the use of students, and yet these questions cannot fail to be of use to the practitioner. A general survey of the volume shows that it is designed for the use of students of medicine as well as of dentistry, and evidences are plenty that the features of a reference volume for practitioners of general and of dental surgery have been kept in mind as a distinct purpose of the work.

The subject of this special regional surgery may be viewed from two aspects: it may be approached from the point of view of the dentist, or of the general surgeon, either of which has its advantages and advocates, and *per contra*, its drawbacks and critics. The author has approached his subject from both sides, but upon the whole the impression created is that the general surgical light is the stronger.

A line of demarkation between dental practice and the surgical practice described in this volume is quite sharply drawn,—considering the important casual relation borne by dental to other diseases, the reviewer cannot but think too sharply drawn. Be this as it may, Dr. Marshall outlines a territory of subject-matter which overlaps dentistry but partially, and includes, as the title states, a study of the surgery of the face, mouth, and jaws. The inquiry is, how well has the author realized his plan; how well has he done his work?

As a text-book for students the work is well done; for in no other volume, within the knowledge of the reviewer, are the included subjects so systematically treated as in this one, and the subject-matter is up-to-date. Each subject is carefully analyzed and clearly presented. The early portions of the work dealing with general pathology contain in the main eminently well-chosen material; but we believe that in the section upon inflammation the author has erred in ignoring or overlooking Metschnikoff's researches as to the inflammatory process. Metschnikoff's work upon the Comparative Pathology of Inflammation is available, and it is difficult to understand this omission, except upon the probability that the author has been over-influenced by the several German pathologists who belittle the work of Metschnikoff. There are certainly quite as many eminent pathologists who believe that Metschnikoff's work is of equal importance with that of Cohnheim as hold to the contrary view.

Each subject is taken up with the same systematic care as ob-

served in standard works upon the practice of medicine, a feature to be much commended.

As a work of reference, the author's name is alone sufficient to claim for the book immediate and respectful attention. It is a mine of information upon many subjects, and yet there are omissions which should be corrected in a future edition; for example, "cancrum oris" does not receive description.

The section upon tumors occupies a large, a very large, section of the book. Close criticism of this proportion of space might be made adverse, were it not recognized what a large and perplexing problem tumors are in the surgery of these parts.

Especially worthy of note and of high praise is the section on fractures of the superior maxillæ and adjacent bones. The author's unusual experience in this field has given him opportunity for a broad study of these injuries, and for the observations as to the efficacy of a mechanical therapeusis which will be keenly appreciated by the dental reader. The same comment may be made upon his treatment of the subject of fractures of the inferior maxilla. It were a gross injustice to pass without high praise the chapters upon hare-lip and its treatment.

It is a source of regret that the author has not made fuller use of Professor M. H. Cryer's studies in regional anatomy, and that the advantages and use of the surgical engine have not been more broadly and extensively dwelt upon. That hypercriticism might pick out flaws and bestow censure for omissions, is to state a proposition true of any book ever written, but it may be said with entire justice that the author has accomplished well the task he outlined for himself. Not only is he to be congratulated upon a dignified and scientific treatment of his subject-matter, but dentistry and general surgery are clearly the gainers through his labors.

The press-work and illustrations of this volume are of a character beyond criticism. The publishers are earning for themselves a reputation for excellence on the mechanical side of book-making which few publishing firms possess.

HENRY H. BURCHARD.

LOOSENING TEETH OR CHRONIC ALVEOLITIS (Pyorrhea Alveolaris, Phagedenic Pericementitis, Riggs's Disease, etc.). With general directions for the care of the teeth. In two volumes, by Dr. HENRY S. NASH, New York. Volume First. New York: Burton F. Welles, publisher, 1897.

This is a peculiar and interesting book, and because of its peculiarities is one which taxes the resources of the reviewer to the ut-

most in doing it the justice its importance demands while avoiding a condemnation of its weak points which may reflect injuriously upon the whole work. As only the first volume is issued from the press any review must necessarily be imperfect, as only a partial conclusion as to its merits can be reached. It appears from the preface that the solution of the etiology of "chronic alveolitis" was a problem undertaken by the author at the request of Dr. E. J. Dunning, of New York, over thirty years ago, and that "the greater part of it was finished about twenty-five years ago," but owing to ill health and other causes the author has not published the results of his investigations until the present time. We are led to believe that the etiological problem has been solved, possibly the therapeusis also, though the first volume clearly leaves both unsettled. So we may hope for a clear summary of both in the second. The book is a report in narrative form of the steps of the author's study and investigation, consequently the chapter devoted to the historical phase of the subject is a history of the author's connection with the problem, and not a history of what has been done by others in the same connection, as one would be inclined to expect; but when we read his statement that "the real exciting causes of alveolitis have been given no attention by members of the profession," we are led to the conclusion that in the author's estimation the study expended upon this disorder by members of the profession for the past fifty years has been fruitless, in which we think the profession would be justified in disagreeing with him.

In Chapter II are detailed the remedies which the author has tried and the list embraces "all the antiseptics, escharotics, excepting chromic acid, absorbents, and stimulants," including iodin and silver nitrate; all of which failed, but "after about three years of unremitting labor and study * * * * it was found to be possible to arrest the progress of the disease in all those instances where the teeth were not so loose already that their motion in masticating would bring on a recurrence, or where there were complications which I did not understand till a later epoch." The result of the three years' unremitting labor and study does not appear on its face to have given much better results than those achieved by methods now in vogue and generally practiced by the profession, if indeed they are as good. Later we find this: "The application which I first discovered to be uniformly efficacious in effecting a cure (presumably of the kind of cases not excluded as above) was a solution of potassic iodid, in combination with some other agents which would be cheerfully described here except for

the reason that this would be misleading respecting etiology," which strikes us as a precautionary measure of the *similia similibus* order. Certainly it is misleading us in a very important matter to avoid a similar difficulty in one not more so. Besides, we are not prepared to admit that the average dentist can be so easily misled by telling him the straight truth. We are told, however, that this "uniformly efficacious" remedy was later abandoned for a better one, and that we shall be told all about it in the proper place, which is doubtless located somewhere in Volume II, yet to come.

The nosology of the disorders grouped together as alveolitis is discussed in Chapter III, and the author furnishes good reasons for the term chosen for the title of the book. Chapter IV, entitled "Some of its Exciting Causes," deals only in generalities, and omits all mention of specific causes.

As to the antiquity of the disorders treated of in Chapter V, the author is "positive that chronic alveolitis in precisely the same forms which we see it assumes to-day could not have troubled the race previous to from one hundred to one hundred and fifty years ago, except the calcic and scorbutic types, to any noticeable extent."

The relation of the gouty diathesis to alveolitis is quite fully discussed, but the author appears to be handicapped in his judgment by certain preconceived hypotheses which lead to faulty conclusions; for example, he says "Biurates are not commonly, if ever, deposited in the immediate vicinity of a bone except close to some much-used joint, by preference those which are most employed. The roots of teeth would be exceptions to this rule." But is not the union of a tooth with its socket a joint, and is it not a much-used joint also? The author's apparent view that it is not is a contravention of a well-established anatomical fact. He rejects the idea that tartar may be of serumal or sanguinary origin, and says, "It would be anomalous to find that a substance like calculus, which is only deposited by the dehydration of its menstruum, should form between two plates of osseous tissue, the space between which is occupied entirely by a dense fibrous body, too dense and too firmly attached to the bones for any extravasation of any fluid to occur in its substance or between it and the bones without an intense pain ensuing, too intolerable to be borne at all." But this is pure theorizing, not only that it is perhaps an error of fact to assert that calculus is only deposited by dehydration of its menstruum. Competent observers have reported numerous observations of calcular deposits upon the roots of teeth which clearly originated from some source other than salivary, and it

has not been shown by the author of the book under consideration that such observations are erroneous.

The author lays great stress upon his microscopical studies of calculus in showing that both the deep-seated variety (serumal?) and that which is superficial have the same origin (salivary), but we contend that while the minute structure of the calculi in question may furnish some indication of their origin, the microscope alone is incompetent as a means of finally settling that problem. The opinion of an eminent extractor of teeth is quoted in full as to the existence of calculus upon teeth-roots without means of access for the fluids of the mouth, and the testimony is that he "had never seen any such;" in answer to which it may be said that others have seen such, and the question becomes one of the relative value of evidence. What we deem to be the most important part of the book is that devoted to the systemic causes of alveolitis, and in this particular phase of it we know of nothing better on the subject. The point which strikes us most forcibly is that a writer who has so clearly and intelligently grasped the fundamental principles of cellular pathology and the relations of malnutrition to local disease processes should fail to see the direct connection between these central disturbances of nutrition and the local conditions he describes, particularly those which he regards as primarily of local origin. In that respect the work seems to us faulty, but for the good that it contains, the profession is certainly under obligation to the author for placing the etiology and pathology of alveolitis another step in advance of the obscure position which it has until recently occupied.

OBITUARY.

Dr. E. Magitot.

The Odontological Society of Chicago, recognizing the great services rendered by Magitot to the advancement of dental science, has adopted and ordered sent to the family of the deceased, and to the dental journals of the United States and France, the following:

Magitot was born in Paris in 1833, and died there during the current year. His first contribution to dental literature, relating to the structure and development of the human teeth, was made in 1857, at the age of twenty-four, while the last came from his pen in 1897, just before he died. During these forty years Magitot wrote no less than sixty-five books, essays, pamphlets, etc., dealing exclusively with nearly every phase of dental embryology, histology, biology, pathology, hygiene, etc. No writer of any age has made as many, as varied, and as valuable contributions to dental science as Magitot.

The priceless services rendered by him entitle him to rank as one of the foremost investigators in odontology. He was a member of numerous scientific bodies and societies, whose members sincerely mourn his loss. It may be truly said that when Magitot passed away from the scenes of human activity dental science, not of France alone, but of the entire world, lost one of its noblest and greatest minds.

The dental profession of the United States, recognizing and appreciating Magitot's services, keenly mourns and sympathizes with his bereaved family and the profession of France, by reason of his demise.

A. W. HARLAN,
J. W. WASSALL,
LOUIS OTTOFY,
Committee.

CHICAGO, September 1, 1897.

DR. WM. HENRY SMITH.

DIED, at Newport, R. I., June 23, 1897, of senile asthenia and valvular insufficiency, Dr. WILLIAM HENRY SMITH, in the eightieth year of his age.

Dr. Smith was born in Pawtuxet, R. I. He studied dentistry with a practitioner in Norwich, Conn., and was one of the veterans in the profession, having practiced in Newport, R. I., for the past fifty years and for many prominent people. He possessed natural mechanical ability, and made use of it in his profession.

Dr. Smith was twice married, and one daughter, two grandchildren, and three great-grandchildren survive him. The burial was in Providence, R. I.

DENTAL LEGISLATION.

DENTAL LAW OF TEXAS.

FOLLOWING is the text of the new dental law of Texas, passed at the last session of the legislature of that state, and now in operation:

AN ACT *to regulate the practice of dentistry in the state of Texas, and to prescribe penalties for the violation of same, and to provide for the appointment of a State Board of Dental Examiners.*

Be it enacted by the legislature of the state of Texas:

SECTION 1. That it shall be unlawful for any person to practice, or attempt to practice, dentistry or dental surgery in the state of Texas without having first secured a diploma from some reputable dental college, school, or university department, duly authorized by the laws of this state or some other of the United States, or some foreign country, and in which college, school, or university department there are, at the time of the issuance of such diploma, annually delivered a full course of lectures and instructions in dentistry and dental surgery. *Provided,* That nothing in Section 1 of this act shall apply to any person engaged in the practice of dentistry or dental surgery in the state at the time of the passage of this act, except as hereinafter provided; and provided further, that physicians and surgeons may, in the regular practice of their profession, extract teeth or make applications for the relief of pain.

SEC. 2. It shall be unlawful for any person or persons to extract teeth or perform any other operation pertaining to dentistry for pay, or for the

purpose of advertising, exhibiting, or selling any medicine or instrument, or business of any kind or description whatever, unless such person or persons shall first have complied with the provisions of this act.

SEC. 3. A board of examiners, consisting of six practical dentists of acknowledged ability as such, is hereby created, who shall have authority to issue certificates to persons in the practice of dentistry or dental surgery in the state of Texas at the time of the passage of this act, and also to decide upon the validity of such diplomas as may be subsequently presented for registration, as hereinafter provided, and issue certificates to all applicants who may hereafter apply to said board and pass a satisfactory examination.

SEC. 4. The members of said board shall be appointed by the Governor, and shall serve for a term of two years, excepting that the members of the board first appointed shall be made as follows: Three for one year, and three for two years respectively, and until their successors are duly appointed. In case of vacancy occurring in said board by resignation, removal from state, or by death, such vacancy may be filled for its unexpired term by the Governor.

SEC. 4*a*. Before entering upon the duties of this office, each and every member of this board shall make oath before any officer authorized to administer an obligation, who shall be empowered to use a seal of office, that he will faithfully discharge the duties incumbent upon him to the best of his ability. The same shall be filed for record with the county clerk in the county in which affiant resides. The county clerk shall receive for recording same fifty cents.

SEC. 5. Said board shall keep a record, in which shall be registered the names and residences or places of business of all persons authorized under this act to practice dentistry or dental surgery in this state.

It shall elect one of its members president and one secretary thereof, and it shall meet at least once in each year, and as much oftener and at such times and places as it may deem necessary.

A majority of the members of said board shall constitute a quorum, and the proceedings thereof shall be open to the public.

SEC. 6. Every person engaged in the practice of dentistry or dental surgery within this state at the time of the passage of this act shall, within six months thereafter, cause his or her name, residence, and place of business to be registered with said board of examiners, upon which said board shall issue to such person a certificate, duly signed by a majority of the members of said board, and which certificate shall entitle the person to whom it is issued to all the rights and privileges set forth in Section 1 of this act.

SEC. 7. Any person desiring to commence the practice of dentistry or dental surgery within this state after the passage of this act shall, before commencing such practice, file for record, in a book kept for such cases with the said board of examiners, his or her diploma, or duly authenticated copy thereof, the validity of which the said board have the power to determine. If accepted, said board shall issue to the person holding such diploma a certificate, duly signed by all or a majority of the members of said board, and which certificate shall entitle the person to whom it is issued to all the rights and privileges set forth in Section 1 of this act. *Provided,* That any person, whether holding a diploma aforesaid or not, shall have the privilege of making application to said board, and upon undergoing a satisfactory examination shall be entitled to a certificate, in like manner as a person holding a diploma and upon the same terms.

SEC. 8. Any member of said board may, when the board is not in session, grant a license to practice dentistry to a person whom such member finds on examination to be qualified, on the payment of the sum of two dollars by such person. A license so granted shall be valid until the next meeting of the board, but no longer. Each member shall make a report of licenses so granted by him at the meeting of the board following the granting of the license. A member shall not grant a license under the provisions of this section to one who has been rejected by the board as disqualified.

SEC. 9. Every person to whom license is issued by said board of examiners shall, within thirty days from the date thereof, present the same to the clerk of the county in which he or she resides or expects to practice, who shall officially record said license in a book in his office provided for that purpose, and shall be entitled to a fee of fifty cents for his services.

SEC. 10. To provide for the proper and effective enforcement of this act, said board of examiners shall be entitled to the following fees, to wit: For each certificate to persons engaged in the practice in the state at the time of the passage of this act, the sum of fifty cents; for each certificate issued to persons not engaged in the practice of dentistry in the state at the time of the passage of this act, the sum of ten dollars.

SEC. 11. The members of said examining board shall receive the compensation of five dollars per day for each day actually engaged in the duties of their office, which, together with all other legitimate expenses incurred in the performance of such duties, shall be paid from the fees received by the board under the provisions of this act, and no part of the expenses of said board shall at any time be paid out of the state treasury. All moneys in excess of said per diem allowance and other expenses shall be held by the secretary of the said board as a special fund for meeting the expenses of said board, he giving such bond as the board may from time to time direct, and said board shall make an annual report of its proceedings to the Governor by the fifteenth day of December of each year, together with an account of all moneys received and disbursed by them in the pursuance of this act.

SEC. 12. Any person who shall violate this act by practicing or attempting to practice dentistry or dental surgery within the state without first complying with the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in the sum not less than twenty-five or more than three hundred dollars for each and every offense, each day in the practice constituting separate offense. All fines collected from prosecutions under this law shall be appropriated to the common school fund in the county where collected.

SEC. 13. Any person or persons who shall violate this act by extracting teeth or performing any other operation pertaining to dentistry for the purpose of advertising, exhibiting, or selling any medicine, instrument, or business of any description shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in a sum not less than twenty-five nor more than three hundred dollars for each and every offence.

SEC. 14. That all laws and parts of laws in conflict with this act be and the same are hereby repealed.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING AUGUST, 1897.

August 17.—No. 588,444, to F. W. KETNER. Dental engine attachment.
" *31.*—No. 589,049, to C. A. TIMME. Electric dental furnace.
" " No. 589,209, to F. D. GOULD. Tooth cleaner.
" " No. 589,332, to S. S. BLOOM. Artificial teeth.
" " No. 589,383, to H. E. DENNETT. Artificial tooth and method of making same.

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

MACROSCOPIC TOOTH-DEVELOPMENT.

BY I. NORMAN BROOMELL, D.D.S., PHILADELPHIA, PA.

(Read before the American Dental Association, August 4, 1897.)

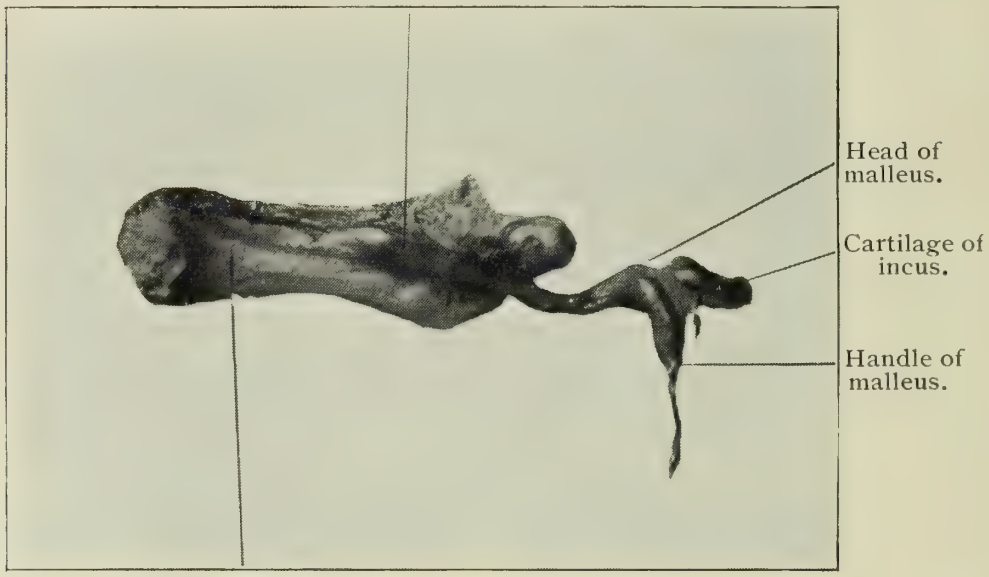
BEFORE taking up the subject of tooth-development it will be eminently proper briefly to describe those parts directly concerned in the process. At a very early period of fetal life we find preparations are being made for the development of the maxillary bones. That these are about the first bones to be called into functional activity accounts in a measure for their very early development. The osteoblastic activity in the intercellular substance destined to become the inferior maxilla begins about the middle of the second month of fetal life, while at a somewhat later period a similar action takes place in the region of the superior maxilla. It will be unnecessary to give a detailed description of the development of the body of these bones, but to that portion which gives lodgment to the tooth-germs, and which in a measure is controlled by their presence, some attention must be given, and for this purpose the mandible will be used.

Fig. 1 represents the lingual face of the lower jaw after removal from a three months' fetus. Attached to it is the remaining portion of Meckel's cartilage, which by this time is much wasted away. It will be recalled that this cartilaginous band appears in the mandibular processes before the beginning of the second fetal month, being formed in two distinct halves, the free ends of which finally unite at the median line, forming a continuous support or framework, about which ossification takes place. At a corresponding period, and in a similar manner, two like processes are thrown out for the superior maxillæ, but, unlike Meckel's cartilage, these do not unite at the median line, but stop short of this, the space thus

resulting being provided for by two additional processes which shoot down from the region of the forehead and provide for the development of the intermaxillary bones. About the middle of the second month a center of ossification appears in the neighborhood of the future mental foramen, quickly followed by others at the symphysis and at the angle. These secondary centers soon unite with the primary one, and by the end of the second fetal month the osseous contour of the primitive jaw is established. While ossification takes place in the membrane surrounding Meckel's cartilage, the cartilage itself does not appear to be directly concerned in the process, and by the sixth or seventh fetal month the mandibular portion completely disappears, while that portion near the tympanum is ossified into the malleus. That portion of the bone which forms above Meckel's cartilage and the inferior

FIG. 1.

That part of cartilage not yet ossified.



Ossified mandible.

dental nerve is that which gives support to the tooth-germs, which are already preparing to occupy its concavity. This cartilage is not confined to the human species, but is the common heritage of reptiles, rodents, birds, and fishes, in all of which it gives support to the developing lower jaw.

Fig. 2 represents the evolution of the mandible from the middle of the third month up to the time of birth. It will be observed that during this interval there is a gradual increase in the size of the bone, but little alteration in its contour. By a constant and gradual osseous deposit about the distal extremity of the bone its length is increased to accommodate the additional teeth as they appear. While the external form of the bone shows but slight variation during this period, the internal structure, or that wherein the tooth-germs lie, is undergoing a complete transformation.

Fig. 3 is illustrative of these changes, beginning with a simple groove or gutter in which the tooth-follicles hang, the follicles exerting a controlling influence over its form. Next comes the appearance of the septa between the anterior follicles, which at this

period are irregularly placed in the arch, followed in a few weeks by a well-defined partition between the cuspids and molars, until finally at birth each follicle is inclosed in its individual crypt, with the single exception of the second molar, in which the distal septum, or that which is to separate it from the first permanent

FIG. 2.



Two-thirds actual size.

FIG. 3.



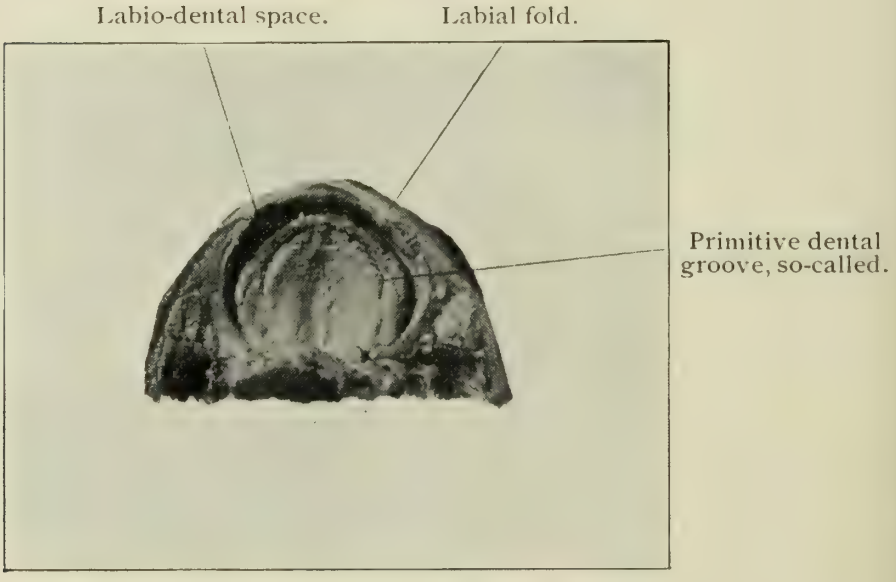
molar, has not yet made its appearance. As the tooth-sacs increase in size, by the development of the teeth within, they become more perfectly inclosed in the bony vaults, the sides of the alveolar walls arching over and almost completely inclosing the developing teeth.

Fig. 4 shows the lower jaw of a seven-months-old child, embodying the condition above referred to. No sooner have the crypts grown to this extent than the resorptive action produced by, or provided for, the advancing crowns speedily results in their downfall, to be again built up with the evolution of the permanent teeth. About the first visible sign of preparation for the development of the teeth, other than that made apparent by dissection,

Fig. 4.



Fig. 5.

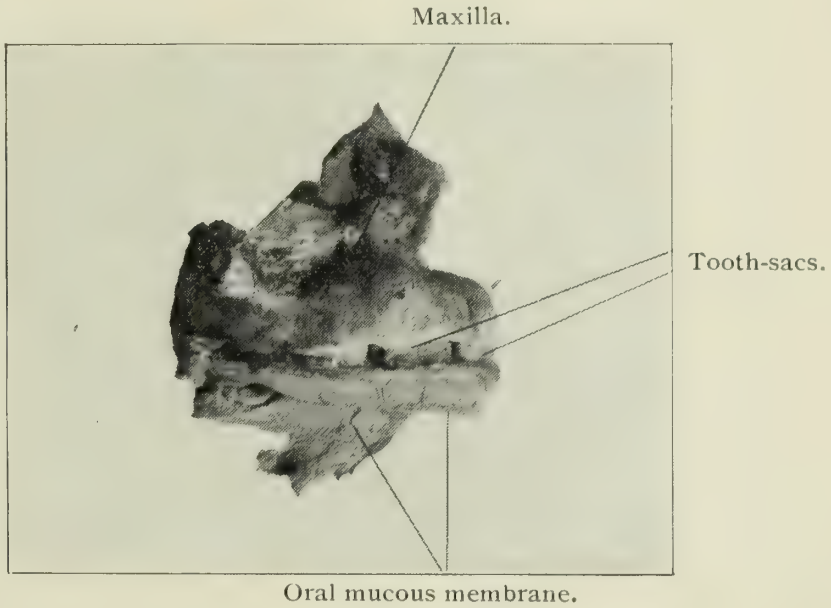


may be observed as early as the beginning of the third fetal month, when, upon opening the cavity of the mouth and looking upon the palate, a well-defined infolding of the epithelial eminence will be seen. In Fig. 5 this condition is shown by a dissection through the oral cavity of a four months' fetus, the outer fold being that of the cheeks and lips, while within is the hard palate and the primitive alveolar ridge. The mouth at this period has passed the rudi-

mentary state, the transverse plates which contribute to the formation of the hard palate having approached each other until the oral and nasal cavities, heretofore existing as a single buccal cavity, have become separate and distinct.

The infolding of the oral epithelium as outlined on the summit of the primitive alveolar ridge—the primitive dental furrow, so-called—marks the position of the tooth-band, from which are given off the incipient tooth-bulbs. For the purpose of further investigation a dissection of these parts was made and the superior maxillary bones removed, after which they were divested of their fibrous covering, including the periosteum. That portion which overlies the palatal processes was readily lifted in one sheet, while that upon the facial surface was separated at the median line and stripped independent of the other, as shown in Fig. 6.

FIG. 6.



The removal of these tissues is readily accomplished until the margins of the partly formed alveoli are reached. Here the periosteum dips down into the various crypts and serves as a lining membrane for them, and probably contributes fibers to the outer layer of the follicular wall.

After advancing thus far the detached tissues may be grasped, and by careful manipulation the tooth-follicles containing the formative organs removed from their respective vaults and turned over for examination.

Fig. 7 shows the result of such a dissection. On the left the palatal plates and alveolar walls of the divested bones may be observed; on the right the fibrous covering which has been turned back from the bones, and to which is firmly attached the ten tooth-follicles for the temporary teeth. If this dissection be made without the precaution of lifting the periosteum, the follicles would not cling to the oral membrane with sufficient tenacity to permit of their ready removal.

It may be of some interest to note that at this early period the

position of the follicle containing the germs for the lateral incisors is that which the tooth is forced to occupy up to and frequently beyond the eruptive period, being crowded within the tooth-line by the central and cuspid, in consequence of which the crypt is thrown well into the palatal plates.

Before entering upon a description of the tooth-follicles as regards their structure and mode of development, let us investigate their contents.

FIG. 7.

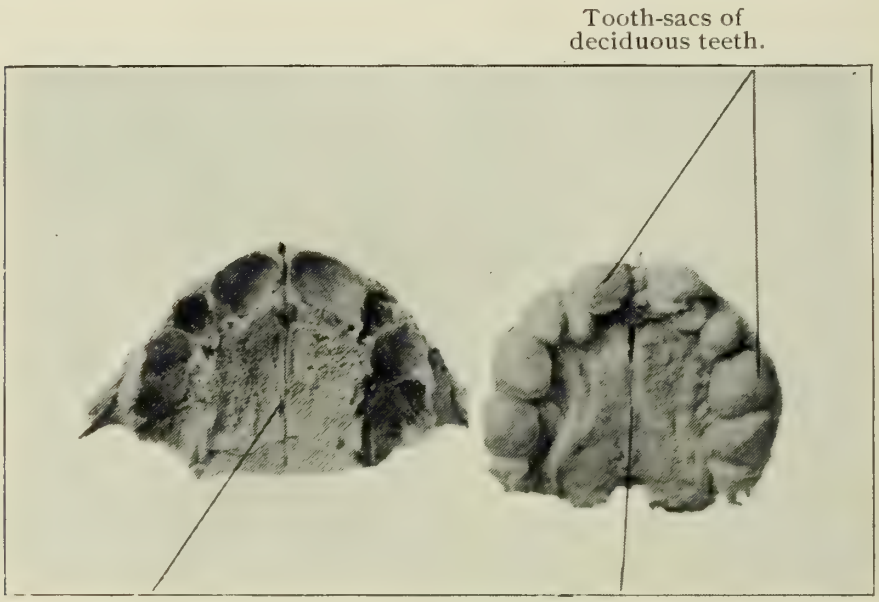


FIG. 8.

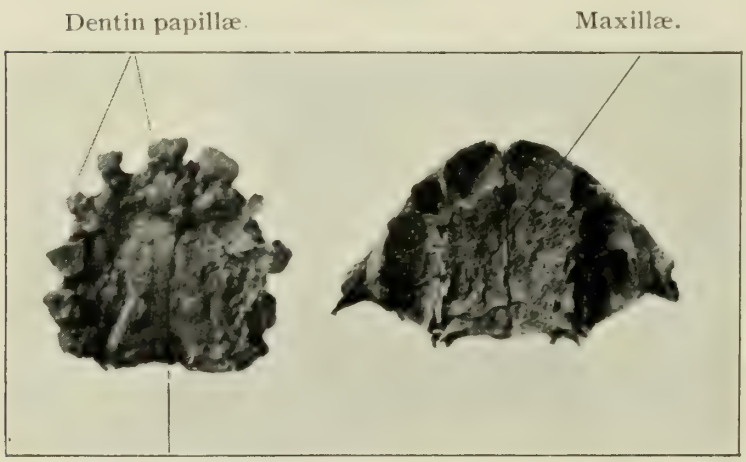


Fig. 8 represents the sacs broken down, exposing to view the dentin papillæ, or those structures destined to become the tooth-pulps. The position which these occupy in the illustration is exactly the reverse from that which they assume when in position in the follicle, being thus reversed that a better idea of their shape may be observed. Prior to the twelfth or thirteenth week of fetal life this incipient bulb or papilla is without definite form, but by the latter period each papilla begins to assume the contour of the future tooth, as faintly outlined in the illustration, those of

the incisors presenting the angular form of the future cutting-edge, the cuspids that of the simple cone, while the coronal extremities of the molars are represented by outlines corresponding to the future cusps and marginal ridges. Beside the dentin papilla, which is the formative organ for the dentin, there is contained within the follicular wall the organ which later on is productive of the enamel, but which up to this time has been actively engaged in molding the tooth-form as outlined by the papilla.

To return to the tooth-follicle, the dissection in this instance being upon the lower jaw of a four months' fetus:

Fig. 9 shows the mandible removed and the dissection carried to the point at which the follicles may be lifted from their bony encasements, this being accomplished by an incision along the base of the bone, followed by a stripping of the membrane, first

FIG. 9.

Oral mucous membrane and periosteum dissected from mandible.



Enlarged one-third. Attachment of follicle to oral membrane.

from the facial and then from the lingual side of the bone. When these two flaps reach the margins of the crypts they are firmly grasped and the follicles removed from their sockets, as illustrated in Fig. 10.

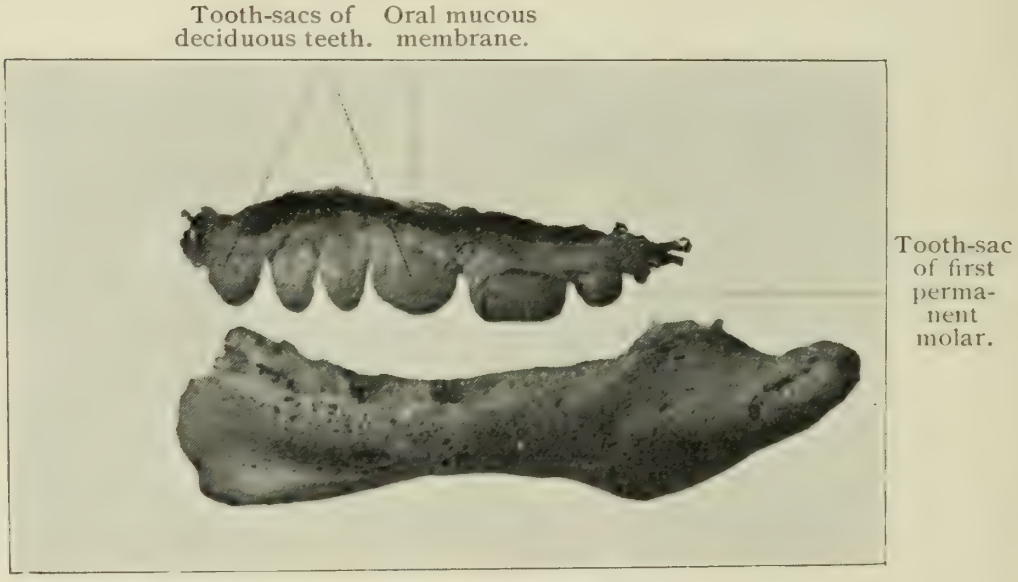
The term "follicle" is only one of a number applied to these parts, "dental sacculus," "tooth-sac," and other appellations being employed with equal significance. By some writers it is customary to apply the term "follicle" up to the period of complete closure, the term sac or sacculus being employed after that time. There appears, however, to be little foundation for such a distinction, the terms being synonymous. Again, the follicle is frequently referred to as meaning the sac and its contents, but this usage is a misapplication of the term. There appears to be no well-founded reason why the follicular wall or sac should not be referred to as such, regardless of the formative organs within.

As to the development of the tooth-follicle, it appears to be a generally accepted theory that at a very early period there is

developed from the base of the papilla cells, which differentiating, form the walls of the follicle. By this growth of cells the papilla is first surrounded, and this step is soon to be followed by an extension of the cellular structure in the direction of the oral mucous membrane, to the deep layer of which the cells become firmly attached, and in so doing inclose the enamel-organ, which hangs like a hood over the extremities of the papilla.

The tissue thus formed from the base of the dentin-germ is continuous with and similar in its origin to the pulp-substance. The primitive tooth-germ, during the formation of the follicular wall, is found swinging in a membranous pocket, being supported by the epithelial band, which in turn is attached to the oral epithelium; but as the walls increase and completely inclose the germs, which is accomplished about the fourth fetal month, the epithelial band is broken, and the second or saccular stage of tooth-development

FIG. 10.



Enlarged one-third.

is reached. The walls of the follicles are made up of two layers. In the illustration the sac for the second molar has been partly divested of its outer layer, which is dense and firm, and finally becomes the dental periosteum; the inner layer being thin, frail, and, in the recent state, somewhat transparent; at an advanced period it assists in the formation of the cementum.

At the beginning of the saccular stage of development the form of the future tooth-crown is well outlined by the dentin papilla, which in Fig. 11 is brought into view by a dissection of the walls of the follicles without breaking the attachment existing between the two. As in the case of the follicle, much confusion of terms in regard to this structure exists, the "dentin-bulb," the "pulp," "dentin-germ," the "papilla" being used *ad libitum*, without apparent regard for the structural changes which are continuously affecting the organ. It would seem proper to simplify this conglomeration of terms by a classification appropriate to the various stages of development. For my purpose the term "dentin papilla"

will be employed when referring to this organic structure up to the time of beginning of calcification, subsequent to which the term "pulp" will be used. As previously stated, the enamel-organ up to this period has been principally devoting its energies to the molding of the tooth-form, and it is not until this model as represented in the papilla is complete that the process of calcification begins.

FIG. 11.

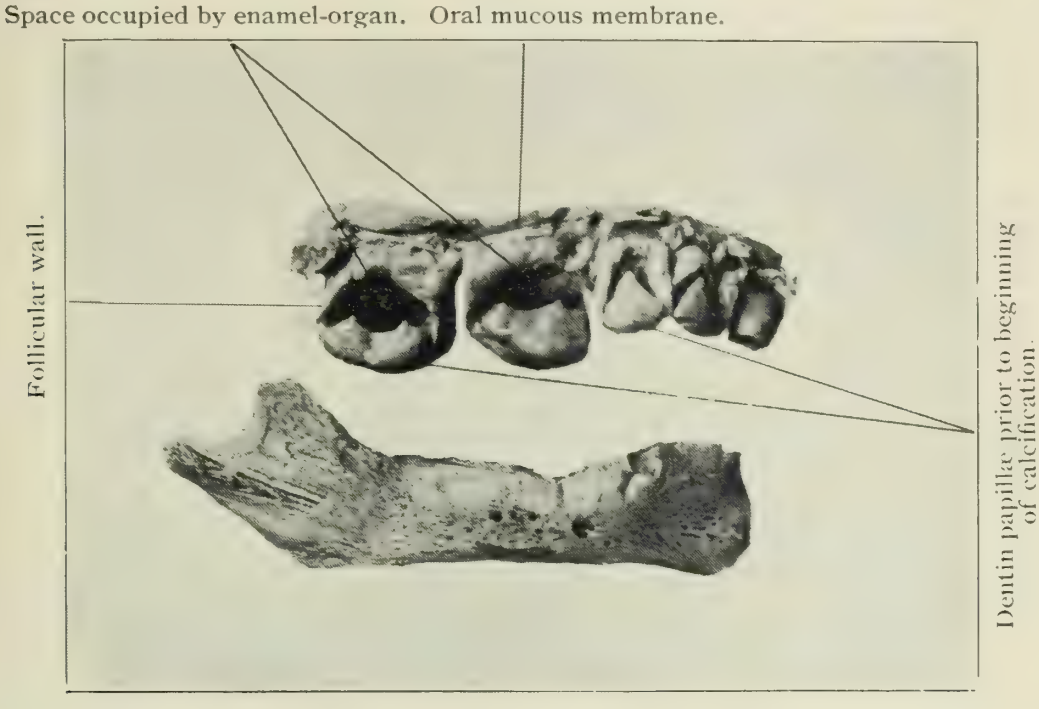
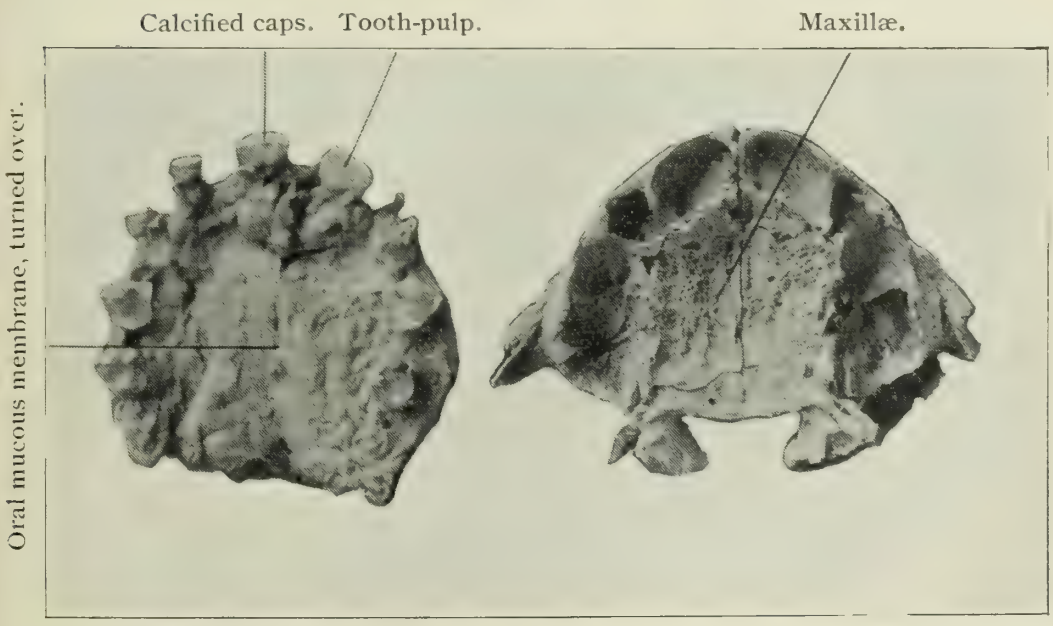


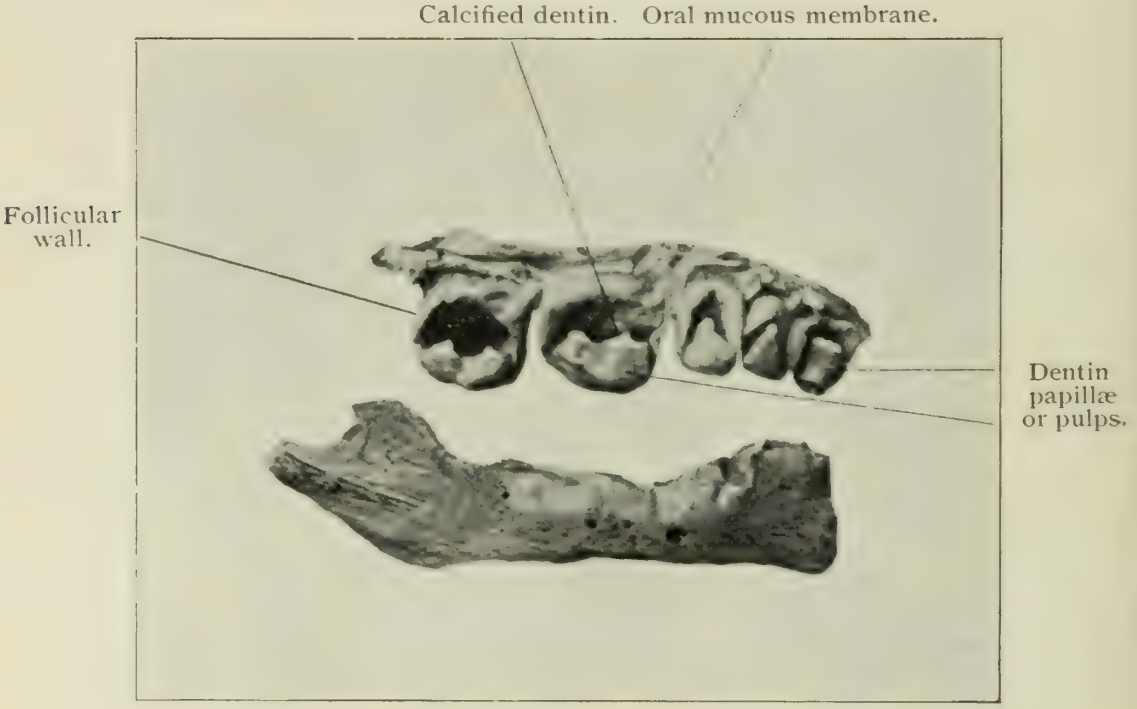
FIG. 12.



About the fourth fetal month preparations for the calcification of the teeth are begun by the development of the odontoblastic cells for the dentin, closely followed by the ameloblastic cells for the enamel, the former establishing themselves upon the peripheral extremities of the dentin papilla, while the latter make their appearance in the enamel-organ, which surrounds and completely envelops the papilla.

Fig. 12 is prepared from a dissection made in a manner similar to that shown in Fig. 8, but at a period about one month later, being from the superior maxilla of a five months' fetus. The dissection shows the extent of calcification at this period, which process also defines the position of the odontoblastic cells upon the surface of the papilla. In the incisors (one of which was lost in the preparation of the specimen) the dentin is seen capping the cutting-edges. The cuspids in this subject have not yet begun to calcify, although it is not unusual to find the cusp of this tooth receiving its lime-salts at this early period. In the molars the summits of the various cusps, as well as a portion of the various ridges descending therefrom, are undergoing the change produced by the impregnation of the lime-salts. It is probable that these delicate caps at this period are composed of dentin alone, the

FIG. 13.



calcoglobulin which precedes the enamel-calcification being somewhat later in forming. From this time forward the pulp undergoes a gradual transformation as to size and form, and there is likewise a change in its cellular construction in those parts adjacent to the calcific action. While the outline of the pulp is gradually changing, its form is permanently recorded upon the periphery of the dentin cap, which when once formed is immutable, all additions to its bulk taking place from within. In the incisors the three primitive lobes or cusps are visible, each indicating a separate center of calcification.

Fig. 13 illustrates the result of a dissection upon the lower jaw of the same subject, disclosing practically the same conditions, with the exception of the sac containing the developing cuspids, which was found with a slightly calcified cap of dentin. This variation between the upper and lower jaws corresponds to that

observed in nearly every dissection, the calcification of the lower teeth being slightly in advance of the upper.

In Fig. 14 the tooth-pulps with their primitive cappings of dentin have been removed from their follicles, presenting a better opportunity of studying the relations existing between these two parts. By the conversion of the coronal extremities of the dentin papilla into odontoblasts, and their active calcification, some positive union between the two structures might be expected. On the contrary, the dentin caps are readily removed, leaving the pulp beneath without the slightest rupture.

FIG. 14.

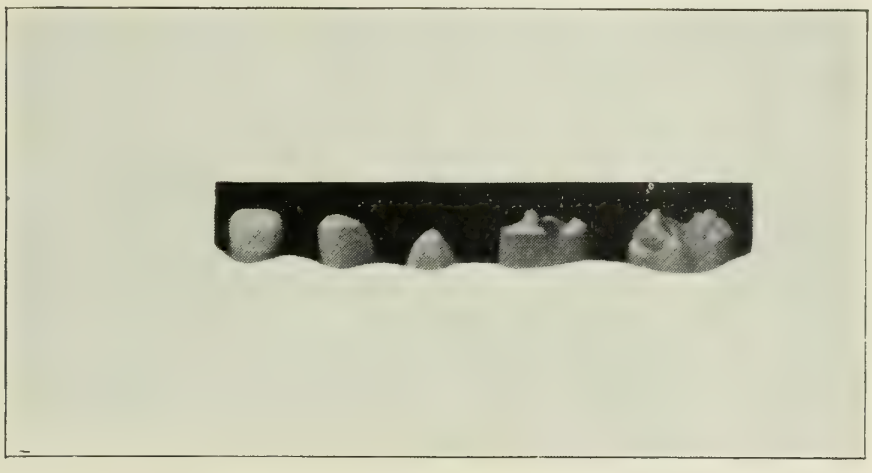


FIG. 15.

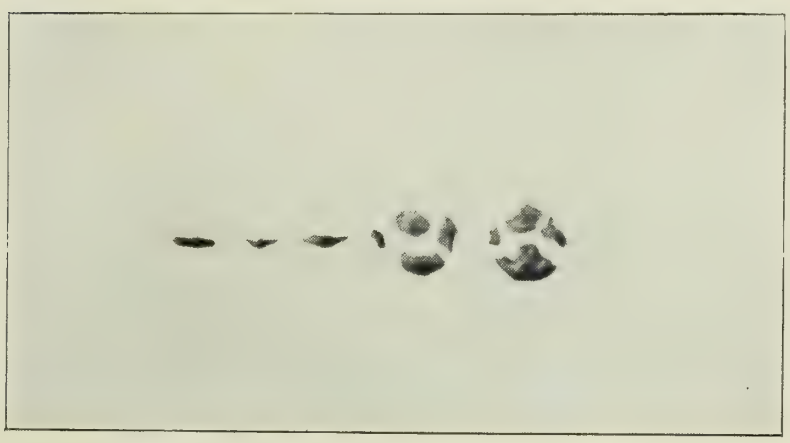


Fig. 15 shows the dentin caps thus dislodged, those for the incisors and cuspids, which begin to calcify from three centers, having coalesced, while those for the molars are separate and distinct, union not yet having taken place.

The next dissection was one made upon the mandible of a six months' fetus. Fig. 16 shows the tooth-follicles removed from the partially formed bony crypts in which they have been incased. At an early period of fetal life, and at a time prior to the completion of the tooth-follicles, there is deposited beneath the tooth-germs a thin layer of bone, which at once begins to assume the form of the partially developed follicular wall. As the growth of the follicle

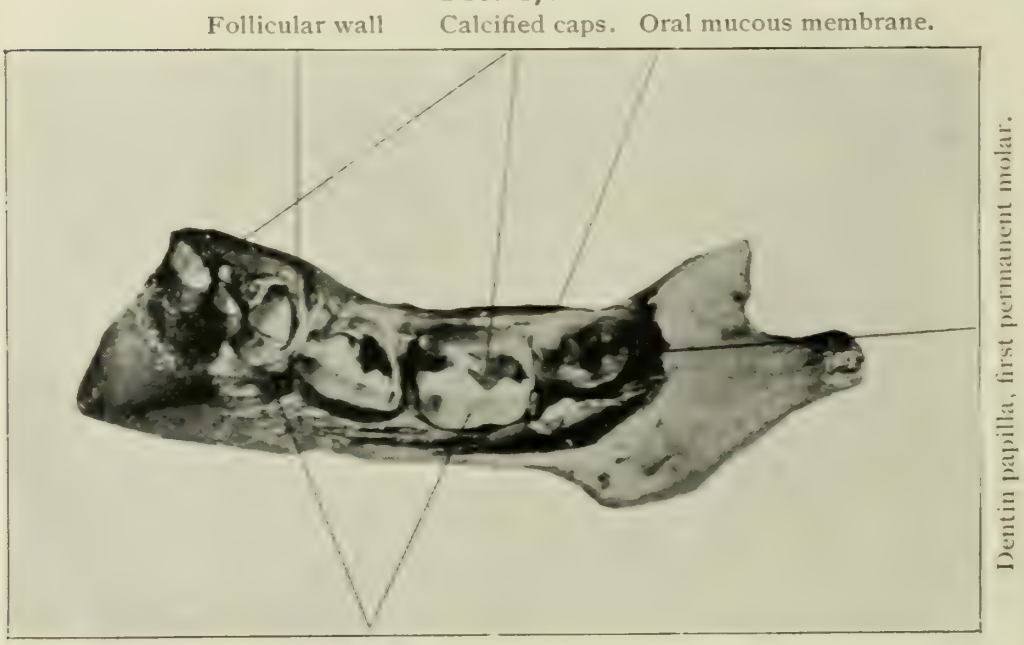
proceeds there is a corresponding increase in the osseous deposit, the alveolar walls extending about and accommodating themselves to the membranous sac. Thus we find in this portion of the maxillary bones a feature peculiar to itself,—that of a continuous transformation from its earliest inception to the adult period, first developing about the temporary tooth-sacs and completely incasing

FIG. 16.



Lingual surface of mandible.

FIG. 17.



Tooth-pulps.

them, which is speedily followed by complete resorption of the walls, again to be followed by a rebuilding during the evolution of the permanent teeth, to be again swept away with the loss of these organs.

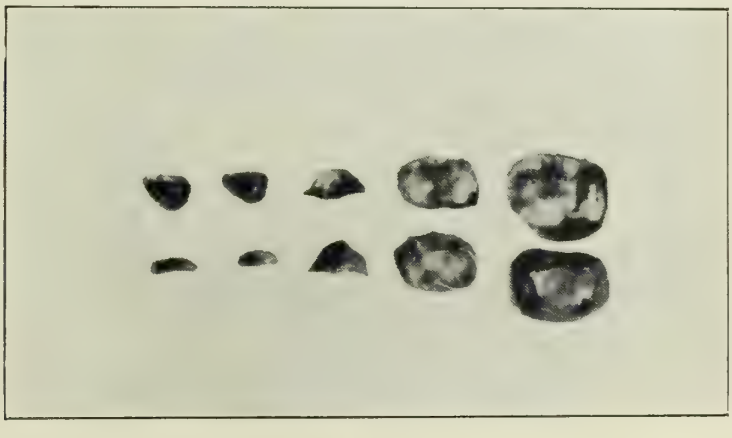
Fig. 17 displays the opposite side of the same jaw, with its outer or facial plate removed, together with the intervening septa. The follicles are opened and the extent of calcification at this period

(six months) made apparent. The pulp and calcified caps are approximately as found when dissected, save a slight settling of all the parts. The incisors have calcified to about one-third their full coronal length, the unicuspid contour of the cuspid has been established, as shown by the deposit of lime-salts upon the summit and the upbuilding of the mesial and distal cutting-edges. The first molar has its occlusal surface about completed, and while the cusps of the second molar are nearing completion there is a lack of union in the central and distal fossæ. Immediately posterior to the second temporary molar the sac which contained the forma-

FIG. 18.



FIG. 19.



tive organs for the first permanent molar has been opened, exposing to view the dentin papilla, which at this early period has assumed the form of the future tooth-crown, and calcification is about to begin.

Fig. 18 illustrates the pulps and calcified caps removed from their respective follicles. As calcification proceeds it will be observed that the angularity which originally accompanied the calcifying caps of the molars is gradually disappearing, also the tri-tuberculate stage of the incisors and cuspids, as represented upon their cutting-edges, this change being brought about by the enamel deposit.

Fig. 19 shows the calcified caps removed from the pulp and so arranged that both their external and internal anatomy may be

studied. Prior to this period there has been but little alteration in the form of the dentin pulp, only a gradual decrease in its size being noted; but now we find it being divested of many of its angles, particularly those which originally served as a basal form for the coronal extremities of the future tooth. With the disappearance of these the concavity within the cap is slowly assuming the form of the future pulp-chamber.

FIG. 20.

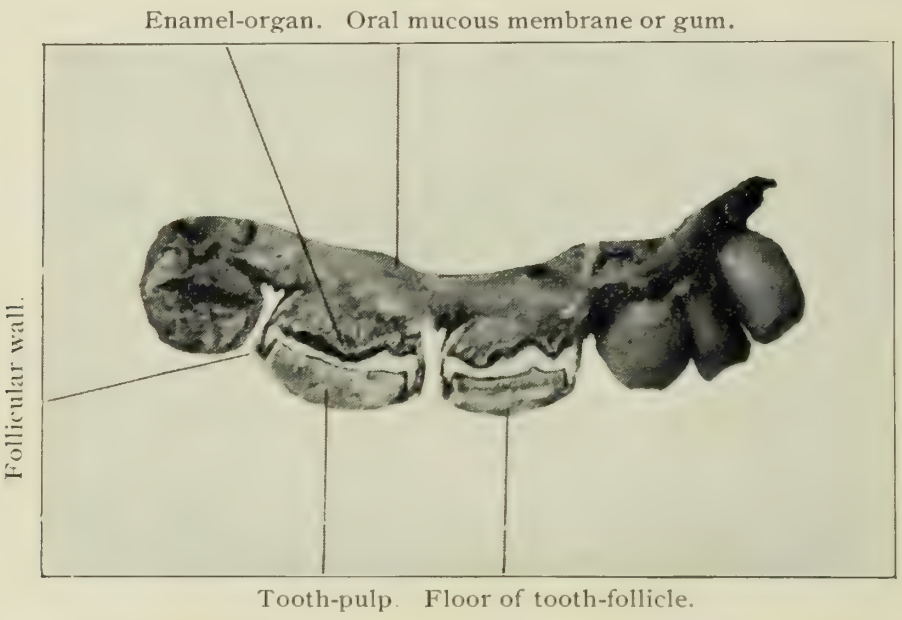
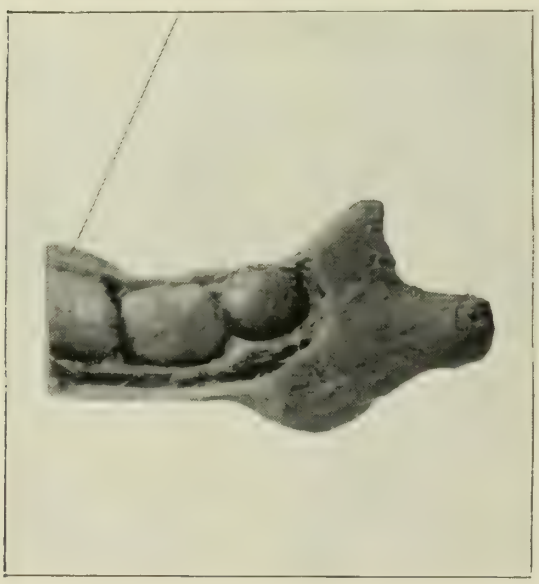


FIG. 21.

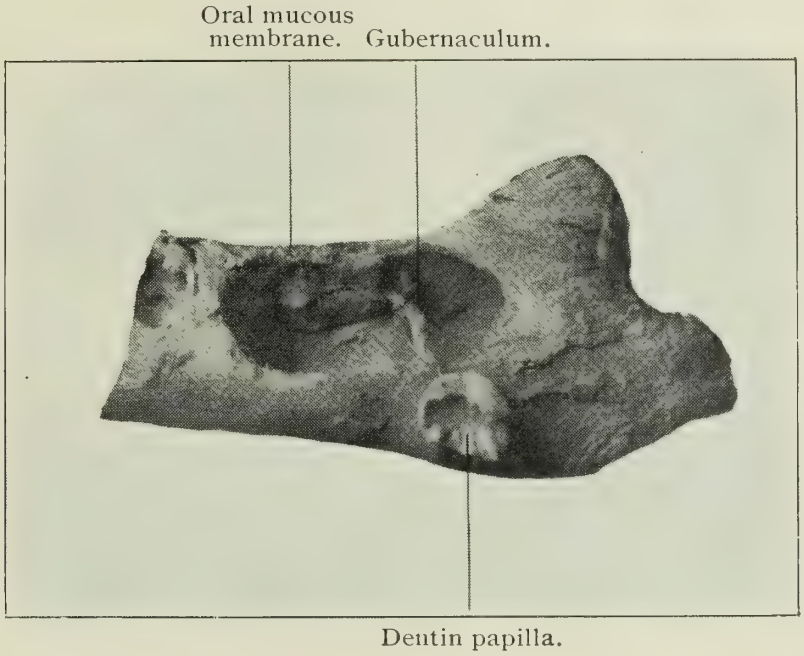


That a better understanding of the saccular stage of tooth-development might be had, a transverse incision was made through the molar follicles, as shown in Fig. 20. In this the attachment of the follicular walls to the deep epithelial layer is visible, while within the walls is the enamel-organ, the calcified dentin, and the tooth-pulp. As previously stated, the enamel-organ is seen suspended above and forming a hood-like investment to the calcifying structure. This organ not only overhangs the occluding surface

of the tooth, but completely envelops the sides of the calcified cap and dentin pulp. Previous to the beginning of calcification the enamel-organ is in close proximity to the dentin papilla, the original form of the latter being here represented by the calcified dentin.

We have now arrived at that period of fetal existence when it is possible to study the macroscopic development of the first permanent molar. Fig. 21 represents a section of the lower jaw of a six months' fetus, and displays the sacs containing the developing temporary molars, as well as that of the first permanent molar. In most respects the evolution of this tooth, as well as that of all the permanent teeth, is similar to that of the temporary, having its origin from the primitive tooth-band, which is continued horizontally backward as the jaw increases in length, and between the

FIG. 22.



second and third fetal month the enamel-organ for the tooth is given off, and thereafter the developmental process is identical with that of the temporary teeth.

There is one structure, however, intimately connected with the development of the permanent teeth, but not found in connection with the temporary teeth, and that is the gubernaculum or leading cord. Fig. 22 represents another section of a six months' fetal mandible, with the dentin papilla for the first permanent molar turned out from the follicle after being rolled from its bony incasement. Attached to the apex of the sac (which has been turned back), and leading from it to the epithelium of the jaw, is the gubernaculum. This fibrous structure was at one time thought to be directly concerned in the development of the tooth. Although this is denied at the present time, little is said in regard to its function, but it undoubtedly serves the purpose of directing the tooth to that position which it should occupy in the jaw, and where the least resistance to its eruption is formed by the foramen

which the cord has established. Each of the permanent teeth is provided with a similar cord, an illustration and further description of which will follow later.

We will now return to the temporary teeth. Fig. 23 shows the result of a dissection at the seventh fetal month, illustrating the extent of calcification at that period. Fully one-half of the incisor, cuspid, and first molar crowns is formed, while the second molar has its occlusal surface about completed. We have now arrived at a period when the subject under consideration naturally becomes of deeper interest. I refer to that time when the being changes from a complex dependent condition to one of

FIG. 23.

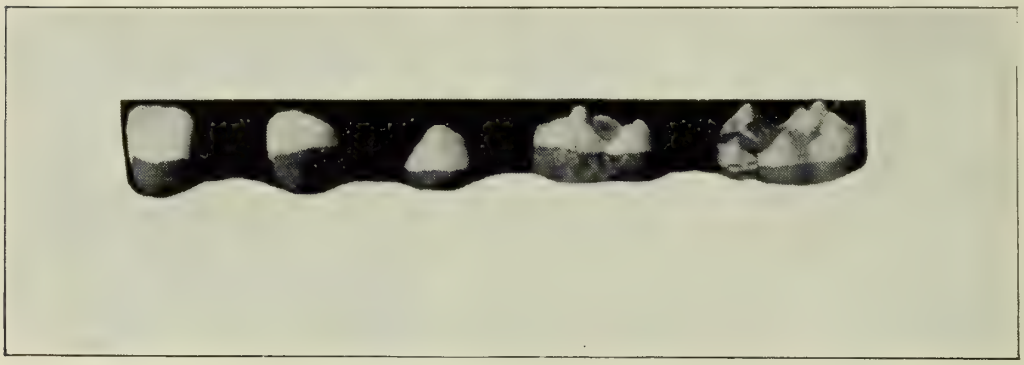
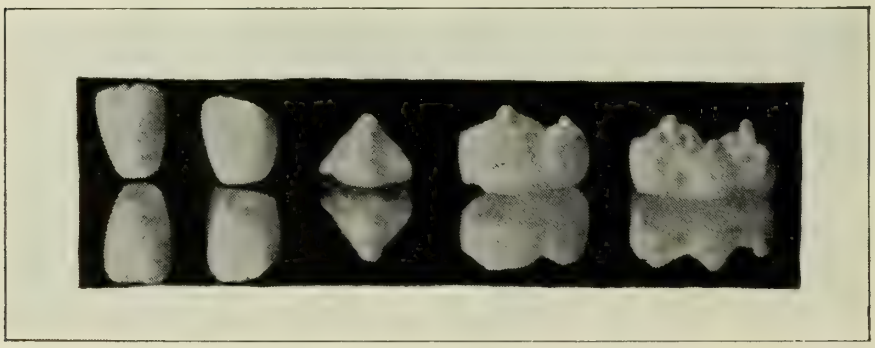


FIG. 24.



Reflected picture.

self-providing independence. Previous to the time of birth the teeth appear to be but little disturbed by certain morbid conditions which might be present in the parent, and from their earliest inception up to this period their development proceeds with but little interruption and with much regularity. From the numerous dissections made in preparation for this paper, I found the teeth at birth about as represented in Fig. 24, the central incisors having calcified to the cervical line, the lateral incisors to a point corresponding to the summit of the palato-cervical ridge, the cuspids having advanced somewhat beyond the angles of the crown, while the molars have their crowns calcified to about one-half their completed length.* With all this progress as repre-

* With slight variation this corresponds to the investigations made some years ago by Professor Peirce.

sented in the external contour of the tooth-crowns, the internal form appears to be extremely slow in assuming the shape of the future pulp-chamber, as shown in Fig. 25.

Fig. 26 is another illustration of the upper teeth at birth, and depicts to better advantage the concavity of the pulp.

From the beginning of the saccular stage of development up to the time of birth, there is but little increase in the diameter of the tooth-sac, but there occurs a gradual increase in its length. Fig. 27 shows the mandible from a child one week old, with a greater part of the external or facial surface of the bone removed, exposing not only the sacs containing the developing temporary teeth, but

FIG. 25.

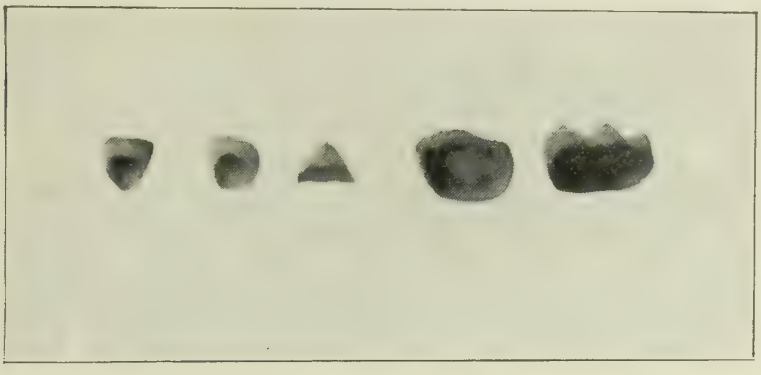
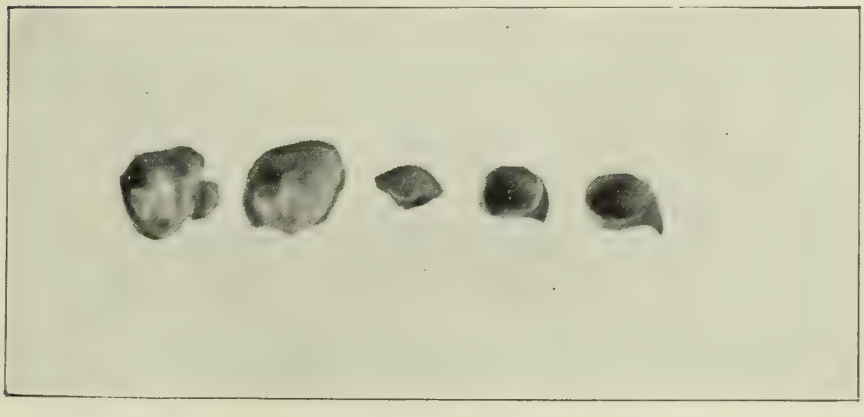


FIG. 26.



also of that of the first permanent molar. The relation of the sacs to the inferior dental canal is apparent, as well as the firm attachment of the follicular walls to the oral membrane.

In Fig. 28 the sacs have been dissected and the pulps removed from the calcified caps, presenting a further illustration of the amount of the dentin deposit at this age. In the first permanent molar the summits of the various cusps are showing the effect of the calcific action.

To further illustrate the size and form of the pulp, as compared with the calcified cap at this age, a transverse incision was made through the left superior maxilla, at a point corresponding with the base of the pulp, as shown in Fig. 29. The calcified parts were allowed to remain in position and resting against the remaining

portion of the enamel-organ, while the pulps were dislodged and are seen resting upon the incised surface. The dentin papilla for the first permanent molar is seen hanging by its gubernaculum. It also may be noted that those parts of the pulp corresponding to the cusps and marginal ridges show a decided convergence of the surface toward the center.

FIG. 27.
Oral mucous membrane.

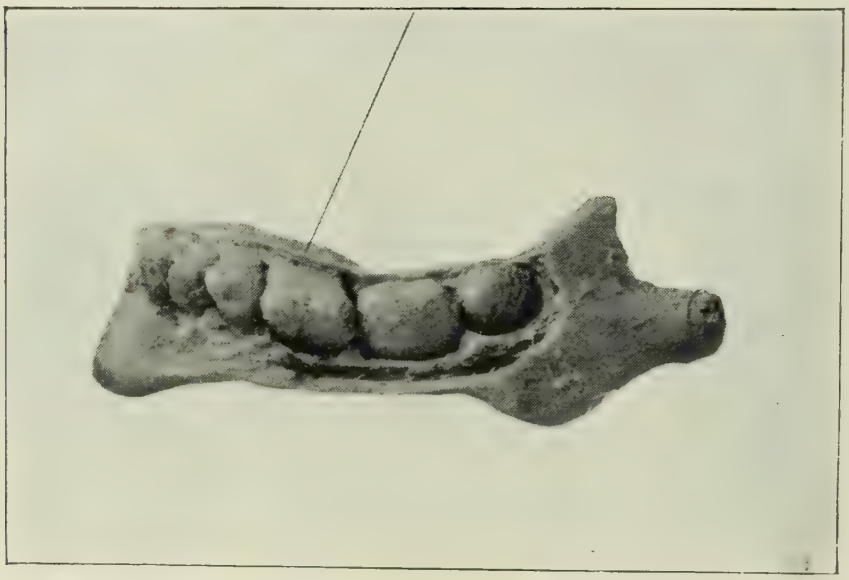
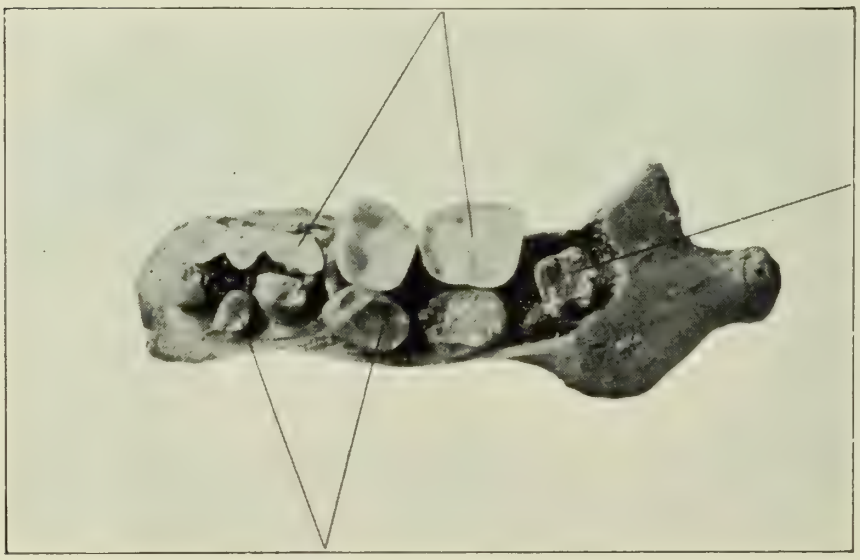


FIG. 28.
Calcified caps.



Dentin papillæ of first permanent molar.

Pulps.

Reference has been made to the formation of the follicular walls by a differentiation of cells which are given off from the base of the dentin papilla at an early period, and to the continuity of the two structures. Fig. 30 was prepared for the purpose of showing these intimate relations. The sides of the sacs were opened and turned back, the calcified tooth-caps, with pulps in position, were grasped and given several revolutions, thus twisting the remaining portion of the walls, the floor of which is seen as a continuous

structure given off from the pulp and connecting it with the epithelium of the jaw.

Before taking up the development of the permanent teeth, I

FIG. 29.

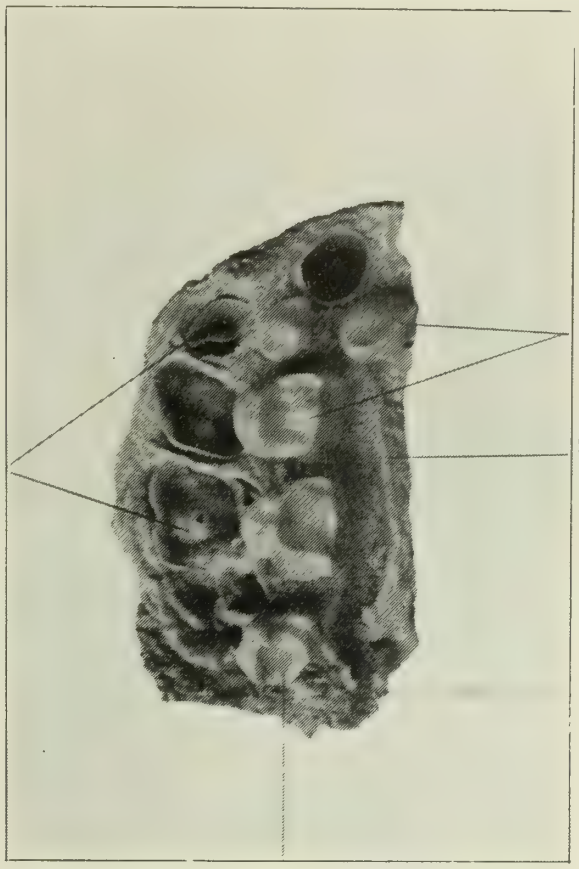
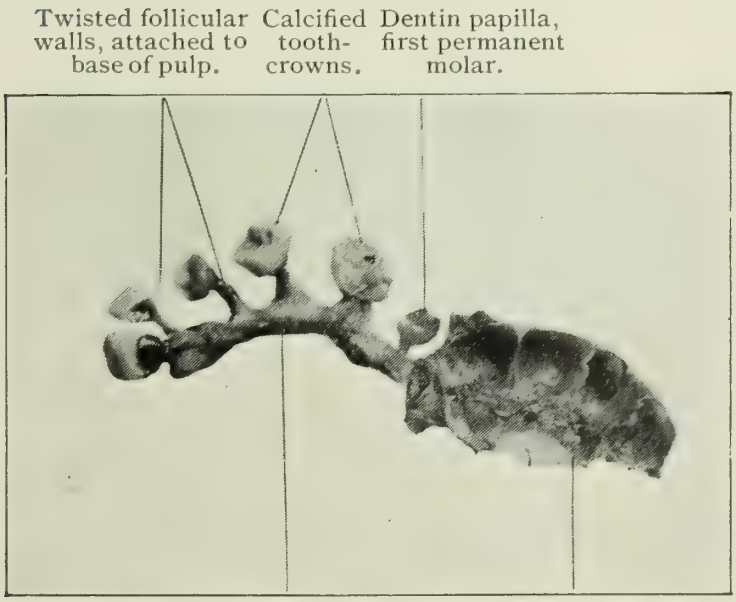


FIG. 30.



desire to call your attention to Fig. 31, and in so doing describe the methods by which the illustration was secured, which serves the double purpose of explaining the evolution of a molar

crown and the dissolution of the pulpal structure, when in the recent state, upon exposure to the atmosphere. The subjects employed for the purpose ranged from the fourth fetal month to birth. In each subject the sac containing the developing second temporary molar was dissected and the pulps and calcified caps removed, immediately placed upon a glass slab, and set aside to note the changes in the organic structure. Within six hours a decided settling of the pulp-tissue was apparent, but no shrinkage

FIG. 31.

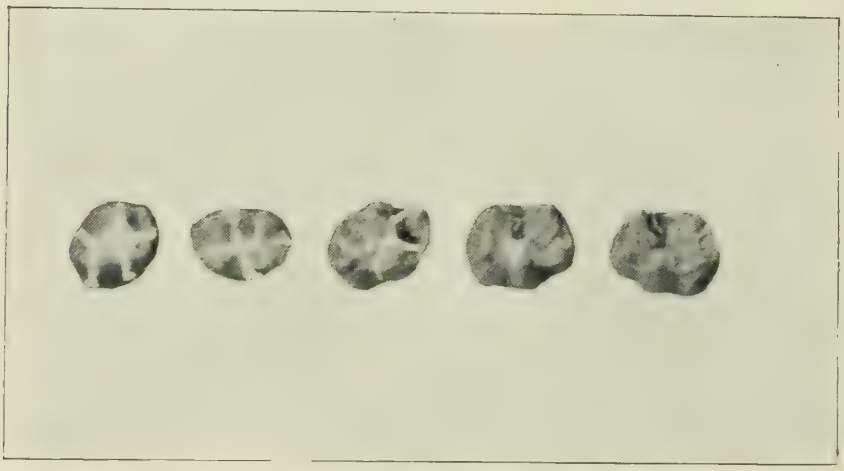


FIG. 32.



of the periphery was noticeable, so that each tuberculate extremity settled immediately beneath its dentin cap. Within twenty-four hours complete dissolution had taken place, leaving behind the calcified deposits, as shown in the illustration.

By this time sufficient advance has been made in the development of the permanent teeth to permit a study of their relations with the temporary organs. The early preparations for the growth of these organs was for a long time a subject of much controversy,

some writers advancing the theory that the follicles for the permanent teeth were produced or given off from the sacs of the temporary teeth, others contending that the cord was derived from the remnants of the primitive cord immediately after its rupture. The now generally accepted theory is that the cord is given off from

FIG. 33.

Foramina of gubernaculi.

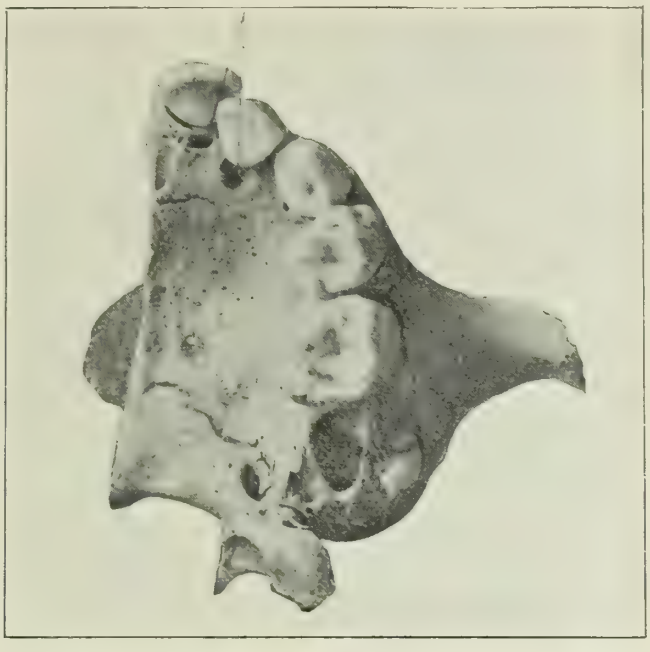
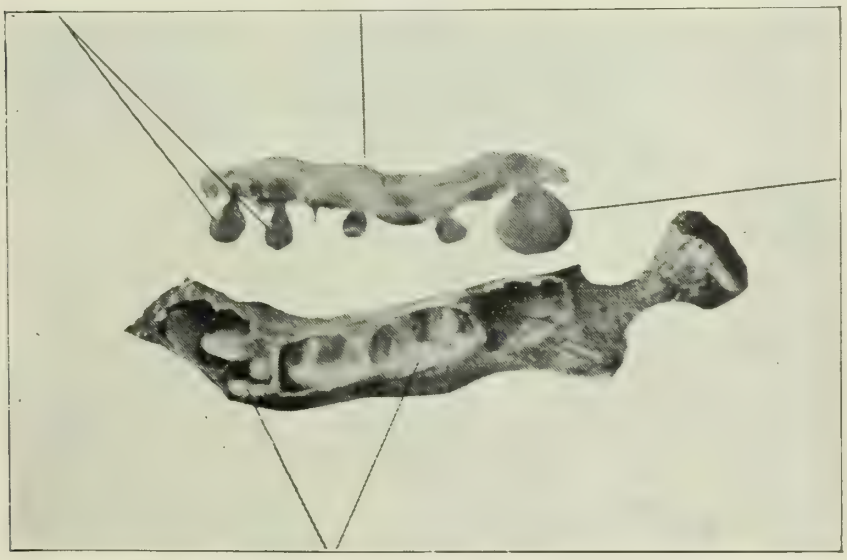


FIG. 34.

Tooth-sacs of permanent incisors. Oral mucous membrane.



Tooth-sac of first permanent molar.

Crowns of deciduous teeth in the crypts.

the primitive cord at a point in close proximity to its attachment to the temporary enamel-organ. Whatever theory be accepted, there can be no mistake about that part of the process which we are permitted to ocularly investigate. I shall therefore proceed to describe the position and contents of the permanent tooth-sacs at birth.

Fig. 32 presents the result of a vertical dissection through the superior maxillary bones, the inner surface of the right superior maxilla being exposed to view. Many of the frail processes, particularly those entering into the construction of the nasal cavities, were lost during the preparation of the specimen, the whole pur-

FIG. 35.

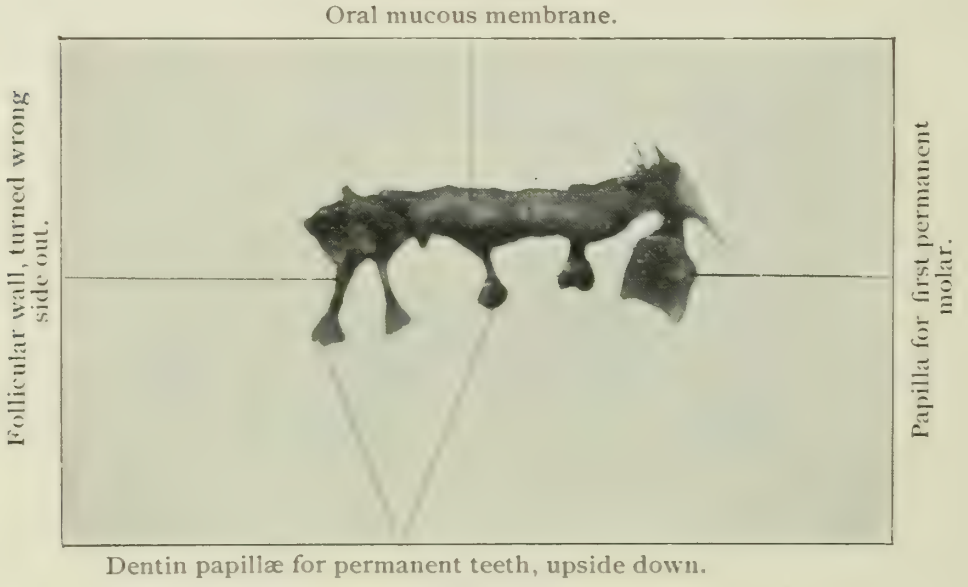
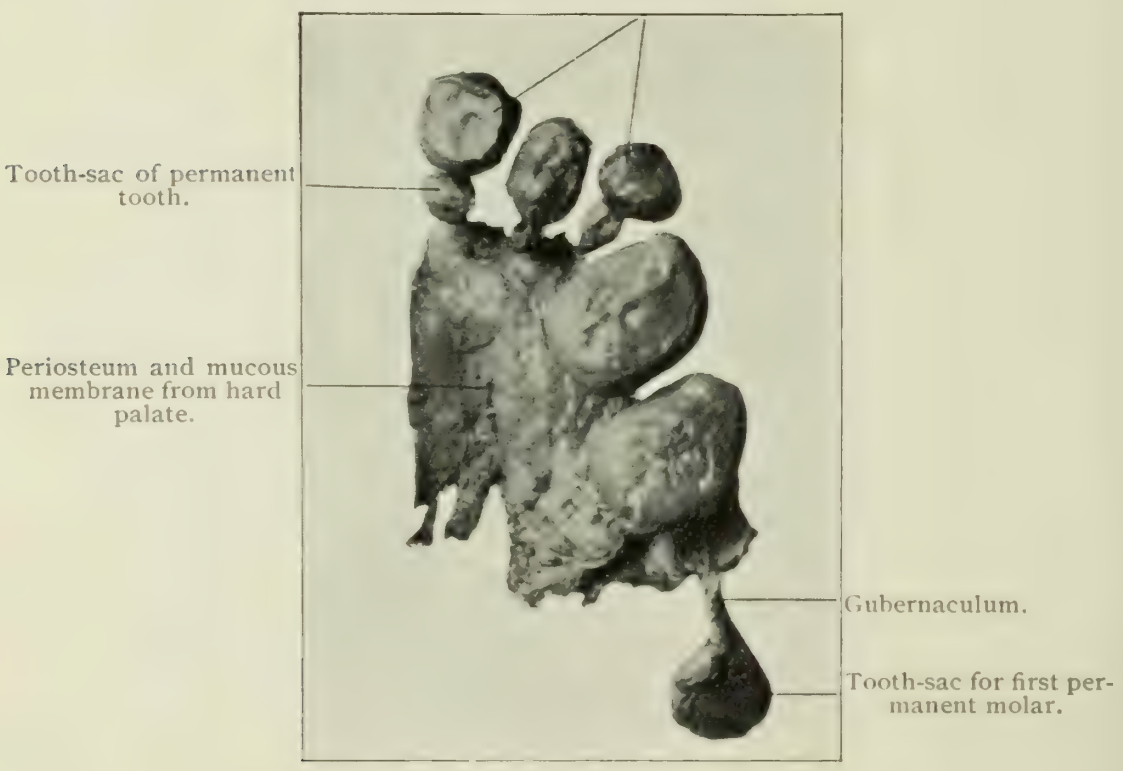


FIG. 36.

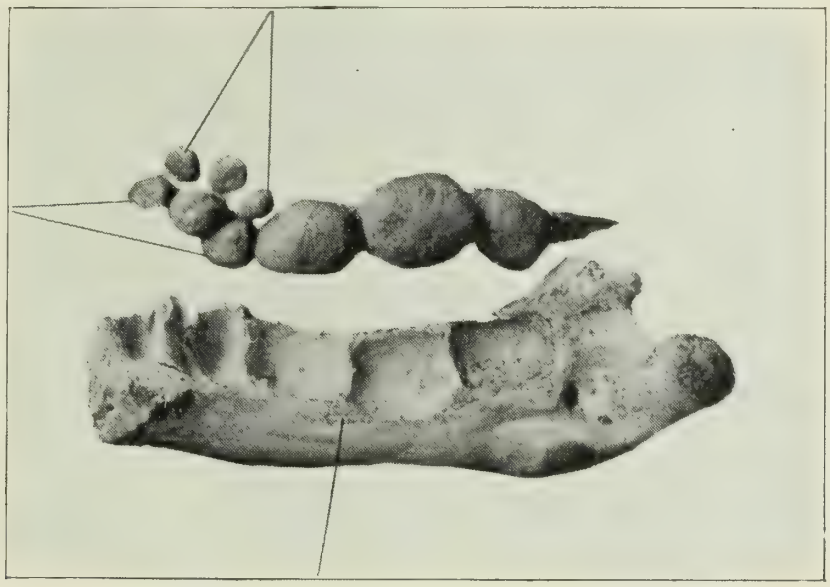


pose of the dissection being to show the sacs for the temporary and permanent incisors. Calcification in the temporary incisors has so far advanced that the contour of the tooth-crown is plainly outlined through the walls of the sac. Resting against the palatal concavity of the crown of the temporary incisor is the sac containing the formative organs for its permanent successor. This perma-

nent sac does not long remain in such close proximity to the temporary tooth-crown, for as the latter advances toward the surface of the gum the former recedes and is soon inclosed in a separate crypt, which is provided with a foramen through which the gubernaculum passes to join the gum. In Fig. 33 these foramina are seen immediately posterior to the incisor teeth. At birth these foramina do not exist as such, the partially formed vaults containing the sacs for the permanent teeth appearing as an extension of the temporary crypts in a palatal direction; but as the temporary teeth advance and the permanent sacs recede the roof of the crypt is completed and the foramen established. This extension of the crypt is more clearly demonstrated in Fig. 34, which represents one side of the lower jaw at birth, with the partially calcified temporary teeth in position in the bone. Suspended above this is the

FIG. 37.

Tooth-sacs of permanent teeth.

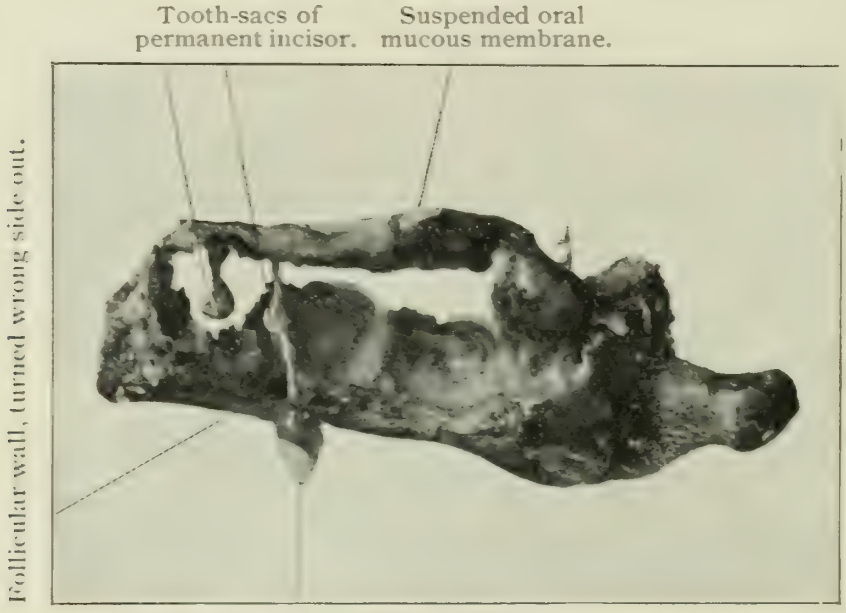


gum, which has been dissected from the bone, having attached to its under surface the sacs for the permanent teeth. Those for the incisors are particularly well defined and their place of lodgment in the bone readily seen. In the case of the cuspid, both the temporary tooth and the permanent tooth-sac are in position in the crypt. The cords which support the incisor sacs are lengthened out from the weight of the sacs, the gubernaculæ not assuming that thread-like form until the permanent sacs have further receded. Fig. 35 shows the result of a dissection upon these permanent tooth-follicles. The dentin papilla of the various teeth are seen in a reversed position, with the follicular walls attached to their bases. At this period the papilla for the incisors may be compared to the tail of a fish, being perfectly transparent over its free extremity, which feature is gradually lost as its thickened base is approached. The fish-tail appearance is further represented by the division of the free extremity into three distinct parts, each of which provides a separate point of calcification.

The cuspid papilla is missing, and the bicuspids have advanced little beyond the form of the primitive bulb. The first permanent molar is shown, with the full diameter of the crown represented by the pulpal mass and the tips of the cusps calcified.

A further illustration of the progress of the development of the permanent teeth may be seen in Fig. 36, the dissection being made upon the left superior maxilla of a one-month-old child. The membrane has been lifted from the bone with the tooth-sacs attached to it. Immediately posterior to the sacs containing the crowns of the temporary incisors and cuspids are those for their corresponding successors, the papilla of which have already assumed the tubercular outline of the future cutting-edges. While the permanent tooth-sacs are distinctively independent pouches, there appears, nevertheless, to be a well-established fibrous con-

FIG. 38.



nection existing between the outer layers of their follicular walls. This fibrous union is gradually broken as the permanent sac recedes, and becomes incased in its own vault.

The next dissection, the results of which are made manifest in Fig. 37, was one made upon the lower jaw of the previous subject, and shows a like state of affairs. In this, however, the attachment of the permanent tooth-sacs in close proximity to the periphery of the temporary sacs is more clearly shown.

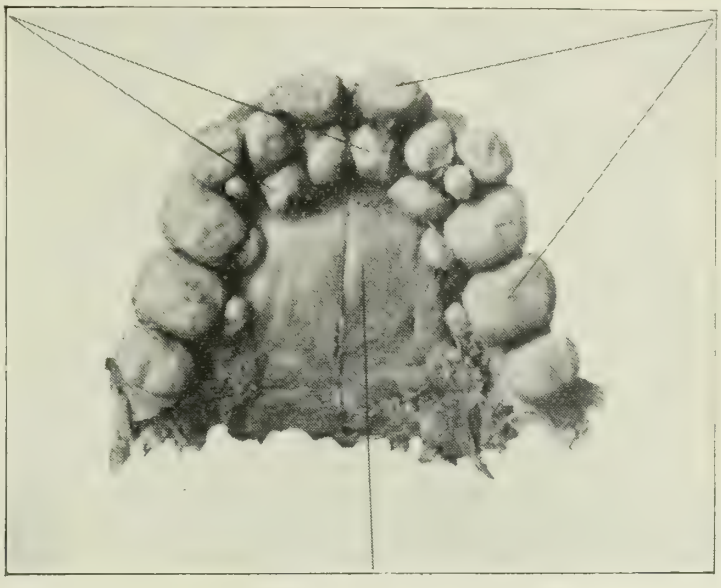
Fig. 38, the next dissection, was one made upon the lower jaw of a two-months-old child, the inner or lingual surface of the bone being removed, with the desire of finding the permanent tooth-sacs. The subject being in the recent state, the results were disappointing, but sufficient information was obtained to warrant the introduction of the illustration at this point. At its proper location the gubernaculum and follicular walls for the permanent cuspid may be seen given off from the deep epithelial layer, while a little below this point is the primitive sac containing the developing organs for this tooth, and below this is the partly calcified

temporary tooth. The vascular supply to the follicular walls is shown in the first permanent molar follicle.

The last dissection made was upon the superior maxillæ of a three-months-old child, Fig. 39, with the result of bringing to view the temporary tooth-follicles and those of their corresponding successors. The permanent incisor sacs at this age are almost equal

FIG. 39.

Tooth-sacs of permanent teeth. Tooth-sacs of deciduous teeth.



Periosteum of hard palate.

in size to those of their predecessors, and the dentin papillæ within possesses a mesio-distal diameter nearly equal to that of the calcified temporary caps. The sacs containing the germs for the permanent cuspids and bicuspids are somewhat diminutive, but the enamel-organ within is already molding the contour of the future crown.

THE RÔLE OF THE DENTISTS IN THE IDENTIFICATION OF THE VICTIMS OF THE CATASTROPHE OF THE "BAZAR DE LA CHARITÉ," PARIS, 4TH OF MAY, 1897.

BY DR. OSCAR AMOEDO.

PROFESSOR AT THE ÉCOLE ODONTOTECHNIQUE DE PARIS.

(Read before the International Medical Congress of Moscow, Dental Section.)

ON the 4th of May, 1897, Paris was the scene of a terrible catastrophe, in which one hundred and twenty-six persons met their death and more than two hundred were more or less seriously wounded.

The Charity Bazaar, at which the greatest ladies of France gave their services for the benefit of the poor, was reduced to ashes in less than ten minutes.

This bazaar had been held every year since 1885 in different buildings. This year it was installed on some waste ground situated in the rue Jean Goujon, in a rectangular shed of varnished

wood, seventy-two meters long and twenty meters wide. The roof was made of tarred cardboard.

The interior was a facsimile representation of a street of old Paris, which was so much admired at the Theatre and Music Exhibition. Each side of the street was bordered by the stalls of the saleswomen. These stalls were of wood, covered with canvas painted to represent the shops of the Middle Ages. It was at these stalls that the lady patronesses sold artistic trifles and works of art for the benefit of charitable institutions, etc. The sellers were recruited from the members of the highest Parisian society, that this charity *fête* had attracted in such immense numbers.

A cinematograph had been installed in the long gallery, almost in front of the exit. This was the cause of the catastrophe. The construction of the building and the contents offering no resistance, the whole bazaar was liable to become a prey to the flames at any minute.

The Apostolic Nuncio came about half-past three to give the pontifical blessing to all present, and at twenty minutes past four, when the crowd was greatest, composed almost entirely of ladies pressing round the stalls, flames were seen darting out from where the cinematograph was situated. In an instant, owing to the combustible character of the roofing and the decorative panels, everything was in a blaze and a fearful panic ensued.

The unfortunate women, half mad with fear, made a rush for the doors, but the means of exit were too few and too narrow, and, falling one onto the other, many perished from suffocation before being burned.

Help arrived promptly, but the violence of the flames was such that in less than ten minutes the roof and walls fell in, burying more than a hundred victims.

I will not describe the fearful picture that the "Bazar de la Charité" presented at this moment,—the horrible cries of the unfortunates burned alive, nor the scenes, terrifying and sublime, of which this was the arena. These facts are fresh in the memory of all.

Nothing could be done except to inundate the burning beams and proceed to clear the ruins. One hundred and twenty-six corpses were transported into a hall of the Palais de l'Industrie, which was near, and it was there on the following days that the relatives of the victims came to recognize the bodies of their friends.

Recognition was not always easy.

The hall to which the bodies had been transported presented a terrifying aspect. The corpses, all horribly mutilated, carbonized, shapeless, a great number entirely nude, had been placed side by side upon planks. Some had lost their arms, others had had a leg completely calcined; all bore upon their faces an expression of fearful terror. Many had the cranium entirely denuded and the integuments of the face blackened and hardened by the fire. The skin of the abdomen had burst from the intense heat,

allowing the intestines of the unhappy victims to fall out. In one corner lay shoes, and arms and legs detached from their trunks.

Over all that the torches of the *gardiens de la paix*—it was nine o'clock at night—threw their lugubrious light and filled the hall with smoke. It was a sickening mixture of the odors of resin, phenol, petroleum, and burnt flesh.

A witness of the scene has given us the following graphic description:

"What a terrible nightmare! Knees broken open as by an axe, arms bent over the head in the attitude of superhuman despair; children's boots; shoes torn from delicate insteps; bodies, as of negroes, opened as after a butchery by anthropophagi; blackened legs, some bent like vine-shoots, some keeping the roundness of their shapes, and the heads, carbonized, shrunk, reduced to nothing, or at least only the teeth remained!"

The following morning an anxious crowd waited, and the search began. The recognition proceeded rapidly, and toward midday only thirty corpses remained. But these were so frightfully mutilated, the fire had so disfigured and reduced them, destroying the last means of recognizing them, that nobody expected the identity of any of them to be established by any one.

But, however, there remained there numerous bodies, and relatives in tears went round looking for some indication which would permit recognition. But in vain. Everything had been destroyed, the bodies blackened, without arms, the legs half carbonized, the heads half calcined, and faces so contracted as to be unrecognizable. Neither clothes, shoes, nor jewelry remained; nothing to give any clue whatever.

It was then that M. Albert Hans, the Paraguay Consul, conceived the idea of calling the dentists who had given their services to the victims. His counsel was followed, and with excellent results. In the face of the powerlessness of the legal doctors, since all ordinary signs of identification had disappeared, our *confrères* were appealed to.

These latter were Drs. Burt, Brault, Davenport, Ducourneau, Godon, and some others.

But their task was not an easy one. On the one hand, the integuments of the faces which had been able to resist the fire had been blackened and become as hard as leather. The greater part of the victims had succumbed with the mouth closed and the teeth clenched; the tissues were set, the muscles contracted, and it was impossible to open either jaws or cheeks to make the slightest examination. On the other hand, out of respect for the unfortunate victims and their unhappy relatives who were present, the magistrates had forbidden any section of the cheek. M. Ducourneau alone was permitted to practice it for the recognition that he had to attempt.

Happily our distinguished *confrères* were in possession of an absolutely certain means of identification. In fact, they all possessed very exact charts of the mouths of their respective patients,

and, furnished with these documents, they asserted their power to recognize their clients. One, for instance, had inserted amalgam stoppings, another gold fillings, a third had put in some pivot teeth and extracted others. Every one of them, in fact, possessed the knowledge of such particularities as would allow them, on examination, to decide one way or the other.

The examinations were made, and, beyond the happy results obtained by way of identification, they permitted our *confrères* to make some useful observations. They were able to ascertain how many gums in general had been protected from the fire by the hardening of the cheeks. One of them told me that he had found some of the mucous membranes pink and almost in a normal state.

Thanks to their assistance, many of the victims were given back to their families. They were, in the first place, the Duchesse d'Alençon, the Vicomtesse de Beauchamp, Madame Nitot, Mademoiselle Barassé, Madame de Villeneuve, Madame Jauffred, and others.

From my *confrères* I obtained much information as to the precise results obtained by these examinations, and I am in possession of numerous documents and the greater part of the registers that they used. These I am keeping for a work I have in preparation.

I only wish to-day to draw your attention to the importance of these facts and to their future value. The importance of identification is patent to every one. You know the situation, in the eye of the law, of a family whose head has disappeared without such disappearance being officially registered. This is briefly how the affair is regarded in France. In the matter of absence the civil code distinguishes three periods; by absence is understood any doubt cast on the existence of a person:

First. Presumption of absence. This period begins as soon as doubts are raised as to the existence of the absent one.

Second. Declaration of absence. This is made by a judgment, which cannot be given until five years have elapsed since the disappearance or since the past news.

Third. Definite possession cannot be obtained till after thirty years after judgment has been given declaring the absence, or one hundred years from the birth of the person absent.

Let us examine the position of the family during these three periods.

During the first period the property of the absent person is badly cared for; the heirs-presumptive have no rights in it, and may not even administer it; they can at the most have a curator appointed by the courts, and this curator, not being controlled, is frequently careless in his office. During these four years they are not allowed to touch any part of the revenue.

During the second period,—Declaration of absence. When four years have elapsed since news was had of the absent person, a judgment of the *Tribunal de la Ière Instance* having declared the absence, those interested may have themselves placed in provisional possession of the property of the absent person. This per-

mission obtained, the will, if one exists, is opened, and the heirs, beneficiaries, or others having lesser rights can enter provisionally into possession, under caution. They can and ought to take any capital due to the absent one, make necessary repairs, lease his property, and place his capital. They cannot alienate or mortgage his property, nor accept nor repudiate any succession which would have devolved on him. They enjoy the revenue of the absent one, but not entirely. If he reappears before fifteen years from the day of his disappearance they must return to him a fifth of his revenue; after fifteen years the tenth; after thirty years the revenues belong to them.

During the third period. The absence has continued thirty years since the entry into provisional possession. Now the beneficiaries may demand the division of the property and obtain the entry into definite possession by the *Tribunal de la Ière Instance.* They become the owners of the property; they can sell or mortgage it. But if the absent one return, they are held to deliver to him all the said property they still possess and the profit obtained from the sale of any part of it.

I trust you will excuse this rather long legal dissertation. But here the facts speak for themselves, and are worth more than any commentary.

The situation, then, of the families is thus terrible; a fortune, more or less considerable, is completely idle during a certain time, and those who have only that resource find themselves in an extremely embarrassing position. The attention of public bodies and that of the medico-legal profession cannot be too strongly drawn to this point, and the humane and social importance of identification cannot be doubted by any one.

Thus it has appeared in an absolute manner, and that not only in the catastrophe of the Bazar de la Charité, but in still other circumstances,—and we need only state the case of the Prince Imperial, son of Napoleon III, and that of the Marquis de Morès, not to speak of more celebrated ones,—it has appeared, I say, that in this sort of examination the dentist has had an important part to play. And this part in the catastrophe with which we are now occupied had only commenced to be employed when all other means of identification had failed, the dentists of the victims being the only ones able to identify them. Beside, it was quite by chance that our *confrères* were appealed to. It was, as we said, on the advice of the Consul for Paraguay.

The servants of the unfortunate victims and those who had been used to be with them were first heard. Influenced by the greatest willingness, these persons could only afford scanty information in the present case. They came hurriedly forward, in tears, half mad with fright at the sight of the horrible scene. And what means of recognition did they possess? Stuffs, pieces of clothing, things entirely trivial and of little importance,—several ladies might have the same dressmakers and wear the same materials.

With these means fatal mistakes might and did take place. It

was thus on the opinion of a domestic that one took away a body that was thought to be that of Madame J. Haussmann. It was transported to the domicile of the deceased, placed in a *chapelle ardente,* and surrounded by the whole family in tears. Suddenly it was discovered that an error had been made. The body of Mademoiselle Dutreil had been taken for that of Madame Haussmann.

Later I had occasion to see Madame Haussmann's dentist, and he showed me the register containing the details of operations he had performed. Their character was such as to leave no doubt that he would have been able to establish the identity if he had been called.

It is useless to insist on the consequences of such errors. I should not have done so if these sad events had not been fruitful with lessons for the future.

It is certain that a body on which are still preserved the clothes worn during life may by them be recognized, though the certainty is not very great. But when nothing is left but blackened rags, one ought, it seems, to show more reserve in having recourse to such indications of recognition.

And why wait for a counsel given by chance to call the dentists of the victim?

It is evident that if, for the purposes of recognition, one takes into account the stuffs, jewels, the proofs of a servant, the documents that the dentist can dispose of are of quite another value. In fact, the teeth are the parts of an individual that last longest after all other signs have disappeared. They have a considerable value from the point of view of identification, and the knowledge that the dentist possesses of the dental system of his client, with the register that he keeps, are means of recognition that one ought not to neglect.

It would thus be desirable that an expert dentist should be named to examine the subject. In that way the identification would be complete, and in many cases this would be the only manner of establishing it.

The sad event of which Paris was the scene must be a lesson for the future. And we dentists have the right to persist in our demand upon the public authorities that the part we are able to play in identifications should not be forgotten, and, above all, that it shall not be placed after others which at first sight, though they appear simple, are certainly less scientific.

Too many interests are involved in these questions to allow of them being, through carelessness, neglected. Security given to families, the means of livelihood assured, the utilization of a fortune that absence has rendered completely unproductive, and, finally, the certainty of being able to avoid the cruel mistakes just referred to,—these are, it seems to me, strong enough arguments from the double point of view, the humane and the social.

And beside, the question is not new, and numerous writers have drawn attention to it. I will only mention the most important. They are those of MM. Dumur, Montfort, Merciolle, Mela, Platschick, Godon, etc.

At the time of the fire at the Opéra Comique, in 1887, M. Godon published in *Odontologie* an important memoir on the question, and finished by making a demand upon the public authorities.

Still more recently, two months before the fire at the Bazar de la Charité, there appeared in the DENTAL COSMOS an article by Dr. Alton Howard Thompson, of Kansas, entitled "Identification by Means of Teeth." This writer is astonished, first of all, that in anthropometric examinations there is no mention made of the teeth. Given the typical character of the teeth, and the difference between the operations that may be made on them, he concludes that the chance is very small that the same case should occur twice. Consequently the teeth would be of undeniable utility in establishing identity.

He reminds us also that in many cases the payment of life insurance has been contested because means of identification were wanting. He also gives us a plan of measuring the dental arcades and the arch of the palate, and advises us to note what operations have been performed on the teeth and the most minute peculiarities they present.

In the same month that the catastrophe occurred, Dr. E. K. Wedelstaedt published in the DENTAL COSMOS "A System of Measurement of Teeth." In the course of this article, the first that has appeared on this interesting question, he is surprised at the results of these measurements. In more than a hundred sets of teeth that he examined he declares that he has never found two central or lateral incisors exactly alike. In the same mouth the measurement of two corresponding teeth has shown the difference of tenths of millimeters. From this he concludes the importance of the teeth in respect to the identification of dead bodies. He even remarks that before long life insurance companies will have the teeth of their clients examined and a chart made of their dental system.

Such was the state of the question at the time of the fire in the rue Jean Goujon. You know what useful work our *confrères*, who were called in, were able to accomplish and what a number of identifications they were able to make.

We must now complete the work that has been begun. We must insist, as Mr. Godon did ten years ago, *that in necessary cases an expert dentist shall be named for the examination of the dental system.*

But the question is of still wider signification, and it is certain that from the point of view of life insurance it will assume greater proportions. In the near future the companies will require an examination of the teeth to be made by a skillful dentist, which, joined to the health certificate, will complete a document which under certain circumstances may be the only means of recognition.

In further extension of this scheme, we may add that for soldiers and criminals this mode of examination furnishes most useful data, and will allow deserters or guilty persons to be recognized more readily than by physical particularities, which are necessarily susceptible of change.

The anthropometrical department, which has been so cleverly organized by Mr. Bertillon, would gain by the addition to the register of each criminal of a special plan marking the condition of the dental system. This register, filled up by an expert dentist, would be of the greatest value. In case of doubt arising as to an individuality, a reference made to the mouth plan would settle the question immediately.

It often happens that the body of an individual is found far from the district in which he lived. The identity might, therefore, have to be settled at any time and at any place. Here arises the important question of an international understanding as to dental nomenclature.

In the case of a body being found in conditions like those of the Marquis de Morès, it is evident that the dentist could not travel any considerable distance to examine the body which he believes to be that of his client. It is therefore necessary that the charts taken by any dentist should be understood by all the dental confraternity. These desirable results can only be obtained when a uniform nomenclature is adopted by the dentists of all countries.

Again, the dentist may disappear, but his books and business remain, and he has a successor. It is necessary that the latter shall be able to continue his practice, and in that case it is necessary, also, to have a uniform nomenclature. It is then indispensable that this understanding should be brought about. A congress like this one, composed of the representatives of all countries of the world, ought to undertake the task of establishing this universal nomenclature.

Hydronaphthol.—With Suggestions for its Use in the Treatment of the Dental Pulp, Alive or Dead.*

BY SIDNEY S. STOWELL, D.D.S., PITTSFIELD, MASS.

(Read before the First District Dental Society of the State of New York, at the Academy of Medicine, 17 West 43d street, New York City, March 9, 1897.)

At a recent meeting of the Odontological Society of this city, at which Dr. J. Leon Williams, London, England, presented his magnificently illustrated paper upon the subject of the "Pathology of the Enamel," and which was so ably discussed by Dr. G. V. Black, Illinois, the coincident fact was brought out that these two gentlemen had for ten years been working upon precisely the same line of research, each ignorant of the other's great work and both arriving at practically the same grand conclusions.

The fact having been well established that two or more persons may invent or discover the same thing at the same time is to me a consolation as I make the claim that the many essential uses of hydronaphthol in dentistry, which I shall herein describe, have, so

*This important paper of Dr. Stowell's was by inadvertence delayed in its publication until the present issue.—Ed. Dental Cosmos.

far as any previous knowledge of the drug was concerned, been original with me as they may also have been with others.

There is no question of so vital importance in all the realm of dental practice which so perplexes the young, and many old operators, and which so places in the balance the comfort or misery of the patient and thereby the success or failure of the operator as, What shall we do with the pulp and how shall it be done?

Three busy years in an office under private tuition, followed by a college education, was entirely insufficient in my own case to acquire the knowledge to enable me to answer this most important question when confronted by it.

There is no other question which has so often caused the conscientious operator to hesitate. He turns from his patient with brow knit in deep thought; he walks up and down the office imploring the gods for guidance as he ponders these questions, Shall I try to save it or shall I kill it; if I try to save it, how shall I proceed; many methods, rules, and materials are before me; which, in this case, will be most likely to be successful?

The text-books upon the subject of pulp-capping have been thoroughly canvassed, the lectures by the college professors are recalled, and many theories of pulp-capping pass before the mind, most of which when put to the practical test are found to be fictitious and only a delusion and a snare.

Something must be done. If I cap the pulp and it lives on in health and comfort, I have done well; I have achieved a success worthy of my calling, though I am liable to receive less credit for my skill from the majority of patients than if I had taken a more radical course, pronouncing it a bad case, and proceeding to devitalize the pulp, following with its removal and the treatment and filling of the canal.

A physician is loved and ever after sought in time of trouble and sickness by the surviving members of a family where his patient has died, though little credit would be given and little afterthought if, by great skill, quick thought, or a judicious remedy, he had brought the sick one back to health in a day.

If I cap the pulp and it dies, my reputation is compromised; the intense suffering of my patient reflects apparently just criticism upon my skill and methods, and I am forced to admit that I should have devitalized it in the first place. If our foresight was as good as our hindsight how vastly different would we course our lives and actions.

The law excuses no man for ignorance; it is his duty to know the law. Our patient does not excuse us for our mistakes or ignorance; it is our duty to know the right and to do it; we are not excusable, even when we have done the best we could, if we fail. God alone, so we are taught, excuses man for his mistakes and failures if he did the best he could; the world and society never overlook the mistakes or forget the failures.

That a tooth with a live pulp is better than one with a dead pulp, however skillfully treated, is a fact conceded by all and substantiated by theories and practice; therefore, if any method or ma-

terial can be introduced as a standard for treatment of teeth having a live pulp exposed, or nearly so, which will save that pulp alive and in a state of health, or raise the per cent. of successes, such method should be hailed with shouts of joy by all humanity.

That I have discovered the elixir of life I do not claim, for it is appointed unto all men, and some teeth, once to die. But there is a balm in Gilead, and it is that which I have brought you; its name is, "hydronaphthol." It was discovered by Dr. Justus Woolf, of New York, and is prepared by Seabury & Johnson, New York and London, who make the following statement: "Hydronaphthol is a perfectly harmless, odorless, non-poisonous, non-corrosive, antiseptic, germicide, preservative, anti-ferment, and disinfectant. Its name indicates a descriptive fancy word which is used to designate a certain secondary compound derived from beta-naphthol by reaction which changes its molecular constitution by means of inorganic compounds that do not enter the molecule, and are finally removed, whereby ninety per cent. of a product is obtained, melting at 116° F."

Hydronaphthol is soluble in the following proportions:

In alcohol, about	1 to	2	parts.
In hot water, "	1 to	300	"
In cold " "	1 to	1100	"
In olive oil, "	1 to	20	"
In ether, "	1 to	2	"
In chloroform,"	1 to	2	"

It is also freely soluble in benzol and the fixed oils. Alkaline solutions dissolve it readily, but greatly reduce its antiseptic properties.

Hydronaphthol possesses one-fifth the antiseptic strength of mercury-bichlorid, double the strength of beta-naphthol and iodoform, three times the strength of salicylic acid, and about fourteen times the strength of carbolic acid. Unlike all these antiseptics it is absolutely non-poisonous, and can be used with perfect impunity as a preservative in cases where no other antiseptic could be used at all. It is claimed that a solution of one to ten thousand will prevent fermentation, but, to arrest the action of putrefactive germs already formed, stronger solutions are necessary.

Whatever hydronaphthol may be, scientific chemical experts have shown that *it is not* beta-naphthol, and medical experts are satisfied that it is a product which produces a physiological action in which all the disadvantages arising from the use of other hydro compounds of naphthalin are entirely removed. Thorough and exhaustive tests and experiments by painstaking scientific investigators in hospital and private practice have established its claim to a prominent and permanent place in the field of antiseptics, because in surgical dressings it is sufficiently soluble to effect thorough antisepsis of the wound discharge, and sufficiently insoluble not to be readily washed away from the dressing by the discharge. It is non-toxic, and may be given in three-grain doses as an intestinal antiseptic in cases of typhoid fever and cholera. Leading American and English physicians have published statements to this ef-

fect. In germicidal powers it ranks second to mercury-bichlorid, but being non-poisonous, non-corrosive, and harmless it is preferable to that substance not only in surgical practice, but in the arts also as a preventive of fermentation, etc. It preserves anatomical and pathological specimens in their natural condition, preventing shrinkage or decay.

A. B. Griffiths, Ph.D., F.R.S.E., F.C.S., in his "Researches on Micro-Organisms," writes, "Hydronaphthol is of great value as an antiseptic agent in surgical operations, etc. A solution one to eleven hundred destroys bacillus subtilis, micrococcus tetragenus, micrococcus prodigiosus, bacillus anthracis and its spores, sarcina lutea, and other microbes, for they cannot be cultivated after its action."

Dr. J. C. McCoy, New York, writes, "After a daily use of hydronaphthol as an antiseptic and disinfectant for several years, I consider it pre-eminent as a dental antiseptic and disinfectant, and for practical purposes it will supersede all other antiseptics in the practice of dental surgery."

Dr. Charles A. Meeker, Newark, N. J., writes, "I am greatly pleased with the antiseptic properties of hydronaphthol. I believe them to be far higher than carbolic acid and other antiseptics, and the fact of its being non-poisonous is a great factor in favor of its use in general dental practice. I have used it for several years and shall so continue."

Alex. Ediegton, M.B., C.M., Edinburgh, writes at length of his experiments with hydronaphthol in hospital surgery and private practice, comparing its efficiency with carbolic acid, and, claiming great superiority for hydronaphthol, concludes by saying, "there can be no doubt of the fact that in this agent we have an ideal antiseptic, and a solution of one in three hundred in warm water possesses very great germicidal power, and such will be found of the greatest service in washing out septic cavities and wounds."

Dr. John I. Hart, New York, writes to me, "I have used hydronaphthol, saturated solution in alcohol, in root-canals; also mixed in equal parts with zinc oxid, then with zinc chlorid as a permanent root-filler; also mixed with zinc oxid and creosote or oil of cloves, placing the paste thus formed over a layer of dentin too close to the pulp to remove, and over this paste flowing oxyphosphate cement. Also combining with tannin and glycerol in pyorrhea-pockets."

In a recent conversation with Dr. Leon Williams, London, England, that gentleman stated as his opinion that hydronaphthol was the most efficient antiseptic known for general or special use in dentistry for treatment of all septic cavities in the teeth and associate parts and pre-eminent as the antiseptic agent in lotions for use as a mouth-wash.

Dr. Harlan, Chicago, states to me that in hydronaphthol we have an ideal dental antiseptic.

Dr. G. V. Black also speaks highly of its efficiency.

Dr. George A. Maxfield, Holyoke, Mass., writes to me that he has made the subject of hydronaphthol a great study, and has

used it for many years with remarkable success, combining it with the various cements and in its various solutions. Dr. Maxfield also incorporates it into a concentrated mouth-lotion as the principal antiseptic agent for which great efficiency is claimed.

That I might prove it well I have used the drug constantly for more than five years to the exclusion of nearly every other antiseptic agent, and with such phenomenal success that I deem it my duty to the profession which I represent, and to humanity at large, that I present its merits here.

I use hydronaphthol principally in two forms, the twenty-five per cent. alcoholic solution and the powdered form. In all cases where an antiseptic solution is required in dentistry I use the alcoholic solution, often reducing it with glycerol or water as the case may require. In the treatment of a putrescent pulp-canal, the penetrating property of the alcohol and its affinity for moisture carries it laden with its hydronaphthol in solution to the remotest nook and corner of the pulp-chamber and canals however small, even to the apex and through into the soft tissues as well as into the tubuli of the tooth. The alcohol having thus penetrated every part it at once evaporates, leaving the hydronaphthol to do its perfect work of disinfection. It is as powerful as a lion, as cunning as a serpent, and as harmless as a dove.

We all know with what fear and dread we have opened into a pulpless tooth of long standing, having no open fistula, and what dire results have followed, supposed to be the result of a multitude of hungry microbes rushing into a fertile field. An inflammation is at once set up which is almost unbearable, the quickening pulse and rapid breathing soon indicate a high fever, and often for two or three days or a week the patient, whether a robust man or a delicate woman, would be confined to the bed in a dark room, there to writhe in agony until suppuration of the inflamed part takes place and the pus burrows its painful path through the plate of bone and soft tissues, and finally breaks and discharges.

In the meantime the physician and dentist have been in almost constant attendance, using all the known remedies for such cases, and neither doctors nor medicines have really done any good, other than to encourage and speak good cheer to the suffering martyr that for all this agony he will still retain the tooth, that it may yet become useful.

We have all been through this experience, either personally or with our patients, and all have realized how powerless we were with all our drugs to relieve our patient's suffering. Gentlemen, I make the statement here that when an old pulpless tooth is opened into, if the alcoholic solution of hydronaphthol is at once placed in the pulp-canal, the conditions referred to are *absolutely impossible.*

I will now refer to another use of hydronaphthol which I have found of priceless value, and so far as my research has extended I may claim originality. I refer to the combination of the powdered hydronaphthol with the zinc oxid of our common oxyphosphate cement. I combine in parts one-quarter of hydronaphthol to three-

quarters zinc oxid, mixing this combination with the phosphoric acid, and using as any oxyphosphate cement for pulp-capping and for protecting permanently all exposed, sensitive, or soft parts in live teeth as an antiseptic, non-irritating lining for all classes of fillings. I first bathe the cavity with the alcoholic solution, which penetrates the soft, leathery decay as well as the tooth-structure; the alcohol soon evaporates, leaving a deposit of hydronaphthol in the cavity. I now either line the cavity or fill it entirely with the hydronaphthol cement, which is rendered non-irritant and antiseptic by the presence of the hydronaphthol incorporated into it. I sometimes incorporate a little oil of cloves or carbolic acid into this cement, which acts favorably as a local anesthetic; with this addition, the foregoing treatment may be applied to a tooth with a pulp slightly or nearly exposed, which has ached some, or may be aching at the time of presentment, with almost positive assurance of successful results and without pain to the patient, who should be instructed to call again in a few months for a more permanent filling, when the tooth will be found to be quite free from sensitiveness; the cavity may now be more thoroughly prepared and a more permanent filling placed in it, lining the cavity again with the combination cement. If, however, the cement is not badly worn, it may be left for a much longer time with still better results.

The addition of hydronaphthol to the cement in the proportion mentioned reduces its wearing quality but slightly if it is mixed hard, but as we use the cement quite soft in the treatment of such cases, its wearing quality is of course impaired. Now whatever of moisture may remain in the soft decay or in the tooth-structure, or may be secreted by the pulp (there being no such thing as a permanently dry tooth in the mouth) and coming in contact with and acting upon the cement-lining immediately sets free more hydronaphthol which at once acts to keep the parts in a thoroughly antiseptic condition, while good old Dame Nature ever ready and willing to heal and restore her diseased and lost parts when given an opportunity goes quietly and peacefully on with her perfect work of recalcification of the affected tooth.

I will say that the results thus obtained have been little short of marvelous, as I have taken liberties with hypersensitive and soft teeth by leaving the soft sensitive decay undisturbed in the cavity, treating it as before mentioned to the delight and comfort of my patient and assurance to myself that I have put nature at her best to restore the affected part to a healthy and normal condition, less the part lost by the first attack of the deadly microbe. I make the claim, and in good faith, that by this treatment in general practice I will save more teeth with living, healthy pulps and with vastly greater comfort to my patient than any one else can do by thorough excavating as suggested by Dr. Ottolengui in his recent discussion of Dr. Williams's paper.

I make still further use of hydronaphthol by combining it with the zinc oxychlorid in the same proportion as with the oxyphosphate cement as a permanent root-canal and pulp-chamber filler; especially is it valuable in this form where we are not sure that we

have thoroughly cleansed the canals, as is very often the case with molar teeth when a "mummifying" agent is required.

In concluding, I may again refer to the recent magnificently illustrated paper by Dr. J. Leon Williams and its able discussion by Dr. G. V. Black, in which we were so clearly shown how bacteria attack the tooth with their chemical weapons, and, as Dr. Black stated, hard and soft teeth alike succumb to their power when conditions favor the carrying on of their chemical warfare.

It is plain that our work as dentists must be only palliative until the world of humanity shall, by obedience to nature's laws of life, become healthy in every part, all micro-organisms being killed or driven out by a flow of oral secretions, which in their normal condition are antiseptic. Until then we have at our command hydronaphthol which is a fortification of defence and a man-of-war for attack upon the enemy.

Anterior Pillars of the Fauces, Their Abnormality, Etiology, and Treatment.

BY GEORGE T. CARPENTER, M.D., D.D.S., CHICAGO, ILL.

(Read before the Dental and Oral Surgery Section of the American Medical Association, Philadelphia, June 1, 1897.)

The anterior pillars are disputed ground, belonging both to the oral surgeon and to the laryngologist, receiving but little attention from either. The faucial arches, like the other parts of the mouth and throat, are covered with mucous membrane. The anterior pillars are formed by the palato-glossus muscles, which extend, as the name indicates. The blood-supply comes from a branch of the descending palatine artery, and the blood is returned by the inferior palatine vein from a plexus surrounding the tonsil, and from the pillars and soft palate into the deep facial vein. The nerves are from the descending branch known as the small or posterior palatine nerves which are conducted to the pillars, tonsils, and uvula. The membrane, which is visible from the mouth, is thinner and slightly redder than that of the hard palate, but like it, is covered with a scaly stratified epithelium. The margins of the pillars are covered with the same epithelium. The posterior and upper surfaces are covered with ciliated columnar epithelium. Lymphatics are abundant on these surfaces, and numerous small compound glands form almost a complete layer under the mucous membrane. Lymph follicles are true lymphatic apparatus whose juices and lymph corpuscles can pass into the nearest lymphatics. It is important to remember that great numbers of leucocytes pass out continually between the epithelial cells covering these follicles, through which, under certain conditions, microbes and other poisonous substances may enter. It is not my purpose in this short paper to discuss the diseases in general that do affect the fauces, such as syphilitic or ulcerative conditions, but it is the dark red or reddish-blue color which is a venous stasis of the pillars and uvula and their shining, sticky, mucous surfaces that I wish to consider. On inves-

tigation I find that in a large number of patients visiting my office for dental services this abnormal condition is present. These parts are easily brought to view by having the patient breathe through the mouth. The patients do not complain of sore throat, but of a fetid breath and sometimes a disagreeable taste in the mouth. The condition of the teeth and gums (in the absence of an erupting or impacted third molar) in many cases does not furnish cause for the existing condition of the fauces. The patient has not applied to a laryngologist, but to a dental or oral surgeon, and it is his opportunity to put the mouth in a healthy condition, and I think it is his duty to have suitable instruments so as to make a proper diagnosis, and either give proper treatment or direct the patient where he can receive the same. The venous stasis of the pillars acts as a sentinel, the etiology of which if not found in the erupting molar, will be found in the tonsil or post nares. The tonsil may have little or no inflammatory action, and the crypts may or may not be filled with a cheesy exudate, and still their sluggish condition will produce foul-smelling secretions, and absorption by the lymphatics will follow. Also stenosis and chronic catarrhal conditions of the post nares will produce a dropping in the pharynx and keep the pillars bathed with a foul secretion, which will taint the breath and produce, through absorption, an abnormal appearance of the pillars. Frequent attacks of coryza which do not receive treatment and are allowed to become chronic, produce the same results and thus become etiological factors. The treatment consists in antiseptic gargles, of which borolyptol, either in full strength or diluted, is one of the best. Also an alkaline and antiseptic wash, as Dobell's solution used as a gargle or spray for the throat and in spray for the nose. The tonsillar condition may be stimulated with silver nitrate 3j or 3ij to aqua ℥j, or the electric cautery can be used to an advantage. When the catarrhal conditions exist any stenosis should be corrected, and the nares and fauces cleansed night and morning with an alkaline spray. In addition to this, two or three times a week, the iodin solution 2 grs. to 10 grs. of iodin to the ounce of water with potassium iodid and glycerol will be found advantageous. I have found great satisfaction in the treatment of this affection, as the condition is always improved, if not entirely cured, and the patients have been grateful for having the trouble removed, which they supposed originated in the mouth.

CORRESPONDENCE.

An Open Letter to the Secretary of the Committee on Colleges National Association of Dental Examiners.

University of Buffalo,
Dental Department.

D. L. Ashley Faught, *Secretary:*

Dear Sir,—Your letter of the 5th instant, directed to this college, is at hand. In answer, we have to say that we cannot comply with

the demands of the National Association of Dental Examiners, for reasons very satisfactory to us, some of which are as follows:

First. We are governed by a state law which establishes a standard much in advance of that of the National Association of Dental Examiners, which is therefore uncalled for and unnecessary. We are under the supervision of a Board of State Regents which knows not the National Association of Dental Examiners, and which will not excuse us from compliance with the state law upon the plea that we have accepted the lower standard of an entirely voluntary body outside the state. We do not and cannot grant our diploma unless the student, before matriculation, presents a Regents' certificate that he has graduated from an acknowledged academy or academic department.

Second. Our own State Dental Examining Board has decided that the National Association of Dental Examiners is not at work on lines that it can accept, has not an organization that it considers sufficient, and, by unanimous vote, it declines to become identified with it. It would be an act of disloyalty on our part toward our own board, with which we have always worked in harmony, should we affiliate in any way with or acknowledge the jurisdiction of a body with which it is not in any way connected, and whose organization and methods it does not approve.

Third. We cannot of ourselves acknowledge the jurisdiction of a body that has no standard of admission to its own ranks, but which receives any one, qualified or unqualified, who may, by political favor or professional chicanery, become connected with a state dental examining board. There are no regulations, so far as we are aware, requiring him to know anything of dentistry, that he shall be living in consonance with any ethical standard, or that he shall be a graduate of any dental college. He may be utterly ignorant of the college curricula, and hence incompetent to sit in judgment upon colleges, or to know what is or what should be included in their instruction. We cannot accept as final the decisions of a body so constituted.

Fourth. We owe allegiance to the National Association of Dental Faculties, a body in which we have representation, and which is quite competent to keep the colleges in line. This body is, as an organization, constantly striving to elevate the standard of education, and it should therefore be supported by every member of the profession, until it has proved itself unworthy their confidence. The rules of this association, the very stringent law of the state, the decisions of the State Board of Regents, and the supervisory powers of the very efficient State Dental Examining Board are quite sufficient for us, and afford about all the government that we can stand. A fifth supervisory body, which is not in harmony with either of the others, would so complicate matters that we could not keep in line with either, and would so embarrass us with conflicting rules that we could obey none of them. If we should accept your regulations we must be bound by them, and to that we cannot agree.

Fifth. We cannot recognize your right to demand this accept-

ance of us. You can act only under state laws, and those peculiar legal enactments are not recognized by our own state authorities, by our Board of State Regents, or by our State Dental Examining Board. To put us under the control of a foreign body, in which we have no representation, would be tyranny of the most oppressive kind, an act of despotism that justified the revolution which gave birth to America as a nation. To demand that we shall accept the standard of a body that may become inimical to us seems the arbitrary assumption of a right that does not exist.

Sixth. We cannot act under duress or give way to threats. In the resolutions adopted by the National Association of Dental Examiners and in your letter there is an implied, a covert menace that if we do not accept your regulations and apply for recognition under them, we will be branded as "unrecognized," or by some other name that may carry reproach to some uninformed persons, and prejudice this school, notwithstanding its higher standard of preliminary qualifications, in the eyes of those who know not the merits of the question involved. We have only to say that in such case we should take aggressive steps to defend our good name, and we have the assurance that we would be supported in this by our state authorities, to whom we owe and pay allegiance.

Seventh. During our whole existence as a school we have been earnestly laboring to secure a higher standard of dental education. To this, our established and published rules, the state law which we have assisted to obtain, and our steady, consistent conduct, bear ample testimony. We will gladly co-operate with the National Association of Dental Examiners toward the same end, but we are not in harmony with the measures that your honorable body are now instituting, and we believe them fraught with mischief to the profession and the cause of dental education.

This may seem to you a plain statement. We intend it for such, but we protest that we are sincere in our belief, that we entertain sentiments of the greatest respect for your body, and are as deeply regretful as you can possibly be of the difference that must exist in our methods and ways.

Thirty years ago dentistry had no legal existence, no real professional status. At that time the Dental Society of the State of New York was organized by legal enactment, with the avowed object of steadily raising the standard of the profession within the state. This end has never been lost to sight, nor has there passed a single year in which some forward step has not been taken, always in the same direction, always with the same steady object in view. Great care has been exercised by the dentists of the State of New York that no precipitate action should be taken, no violent changes made. They have been cautious to see that they went no further than educated public sentiment would warrant them in doing, and the advance has been as steady as it was sure. They have aroused no antagonism that would create prejudice against the constantly progressive enactments, and hence it has been possible to enforce them. There have been no entanglements with bodies outside the state, and the wisdom of this slow, but sure,

policy is demonstrated by the fact that our professional organization and legal status is probably far in advance of that of any other state in the union.

It is not now a time for the State Dental Society, or the schools of the state, which are working in perfect harmony with it, to forsake a policy which has proven itself so wise and efficacious for good. For almost thirty years the State Dental Examining Board has been in existence, antedating that of any other like board. A number of its members have been connected with it from the beginning, while the others have been changed only as death or removal has made this imperative. A board so constituted, whose members have had such long experience, who are each and every one of them honored representatives of the profession of the state, we submit is much better qualified to decide what is and what is not for the best interests of the dentists of the State of New York than is a board whose members, however high may be their personal and professional status, have no standard of qualification for themselves and whose experience is comparatively limited.

At any rate, whether this college would or would not accept your demands, the inexorable law of the state compels us to obey our own state regulations, while our choice leads us to yield allegiance to the National Association of Dental Faculties, in which body we have representation and a voice in legislation.

Very respectfully yours,

W. C. BARRETT, *Dean*,
A. P. SOUTHWICK, *Sec.*

Approved by the Faculty:
ELI H. LONG, *Registrar.*

DENTAL JOURNALS WANTED.

THE following list of American dental journals needed to complete the Library of the Surgeon-General's Office is published in the hope that members of the dental profession will assist in making it a national dental library, as it is now a national medical library, the recent action of the National Dental Association in recognizing it as such having placed the matter directly before them.

As years pass it becomes more and more difficult to obtain complete files of these journals; many are stored away in attics and cellars to be finally used for fires or sold as old paper, and, as a rule, they are rarely for sale by dealers in second-hand books.

The library contains a fair general collection of dental literature of this and other countries, and takes forty-six current dental journals,—all that are known to be published at the present time. Important gaps exist, as indicated in the following list, and it is especially important that these should be filled as soon as possible. A list of dental transactions and proceedings likewise needed will soon be published. Many of the older works on dentistry, of each edition, are also desired, as well as complete series of the annual catalogues and announcements of dental colleges, and correspondence in regard to such is invited.

If necessary, journals and books will be purchased, but the appropriation for the support of the library being limited, it is hoped to obtain most by contribution, using the money for subscriptions to the current journals and such new works as may not be presented to the collection by the authors, as many are.

A large number of duplicate medical works and a few on dentistry are available for exchange, and, upon notification, franks will be sent by which donations may be mailed to the library without expense:

Albany Dental Journal. Want all or any part.

American Dental Review. By A. M. Leslie, Quarterly, St. Louis. Want No. 3, Vol. I (August, 1858), and all after No. 1, Vol. IV (January, 1863).

Cincinnati Dental Lamp. By J. M. Brown, Quarterly. Want all except No. 4, Vol. I (1860).

Dental Circular and Examiner. By B. Wood, Quarterly, Albany. Want all after No. 3, Vol. I (July 1865).

Dental Enterprise. By H. Snowden, Monthly, Baltimore (1860 or earlier). Want all or any part.

Dental (The) Headlight. Quarterly, fol., Nashville, Herman & Morrison Bros. Want No. 3, Vol. I (July, 1880).

Dental Instructor. By E. A. L. Roberts, Quarterly, 8vo, New York. Want all except No. 2, Vol. I (April, 1860), and No. 1, Vol. II (January, 1861).

Dental (The) Jairus. By W. O. Thrailkill, Monthly, 8vo, Sacramento, Cal. Want Vol. IV entire (1883), and all after March, 1884.

Dental Mirror. By C. Walker, Northampton, Mass. Want all after No. 1 (June, 1843).

Dental Monitor. By J. G. Ambler. Commenced about 1855. Want all or any part.

Dental (The) News. By T. P. Wagoner, Monthly, fol., Knightstown, Ind. Want No. 3, Vol. II (July, 1879); No. 8, Vol. V, (December, 1882).

Dental News Letter. By J. D. White and J. R. McCurdy, Quarterly, Philadelphia. Want No. 1, Vol. I (October, 1847).

Dental Office and Laboratory. (Johnson & Lund, publishers.) Monthly, Philadelphia. Want Nos. 2, 3, 9, Vol. I (April, May, and November, 1868); Nos. 1, 4, 5, 8, 9, Vol. II (1869); whole Nos. 21, 23, 29, 39, 41, 44, 47, 51, 53 (1870-72).

Dental Times and Advertiser. By A. A. Blandy, Quarterly, Baltimore. Want title-page and index of Vol. I (1851-52), and all after Vol. I.

Family Dental Journal. By D. C. Estes. Albany, N. Y., 8vo. Want all except No. 3, Vol. I (January, 1854).

New York Dental Recorder. By J. S. Ware, Monthly. Want Nos. 3, 4, 5, 8, 9, 10, Vol. VI (1851-52); Nos. 3, 8, 11, Vol. VII (1852-53).

People's Dental Journal. By W. W. Allport and S. T. Creighton, Quarterly, Chicago. Want Nos. 3, 4, Vol. I (1863).

Roberts and Houghton's (Drs.) Dental Annual. 8vo, Pough-

keepsie, N. Y. Want all except No. 1, Vol. II, and No. 1, Vol. III (1868-69).

Saint Louis Dental Journal. By J. Paine, Monthly. Want all after No. 2, Vol. I (April, 1868).

Saint Louis Dental Quarterly. By C. W. Spalding and H. S. Chase, 8vo, St. Louis, Mo. Want all after No. 3, Vol. I (July, 1878).

Stockton's Dental Intelligencer. Monthly, Philadelphia. Continued as *Dental Intelligencer and Record*, etc. Want Vol. I (1844-45).

Vicksburg New Era. By W. S. Young, Monthly. Want all except No. 11, Vol. I (July, 1869).

Vulcanite. By B. W. Franklin, Quarterly, New York. Want all after No. 1, Vol. III (May, 1862).

J. C. MERRILL,
Major and Surgeon, U. S. Army Librarian, S. G. O.
WASHINGTON, D. C., September, 1897.

AN ERROR CORRECTED.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I am mortified to find that a paragraph in my work on "Chronic Alveolitis," a book just reviewed by you, had quite escaped my notice as requiring correction till I saw your just and courteous criticism upon it. I refer to the one which says, "It is true that the real exciting causes of alveolitis have been given no attention by the members of the profession."

This remark is so very wrong, ungracious, and unjust to my colleagues at the present time, if it were not when it was made, twenty-five years ago, that I beg you to allow me to apologize for the statement and to explain how it came to go out uncorrected.

It was written long ago, as stated, and is upon one of the first pages. This, the historical part of the book, was supposed by me to need no revision. My excessive occupation—whenever I was well enough to attend to my business—compelled me to place my manuscript in the hands of a friend (who happened not to be a practitioner) for criticism. The inaccuracy of the paragraph was therefore not discovered. Fortunately the volume further along shows the statement to be antithetical and misrepresentative.

The printers' plates shall be altered at once, and the proper correction made in all that portion of the edition which is still on hand. There are other changes to be made also, but none which occasion me such deep regret as does this one.

Yours very sincerely,
HENRY S. NASH.

53 W. 33d St., New York, Oct. 17, 1897.

PROCEEDINGS OF SOCIETIES.

AMERICAN MEDICAL ASSOCIATION—SECTION ON DENTAL AND ORAL SURGERY.

(Continued from page 752.)

THIRD DAY—*Afternoon Session* (Continued).

DR. WM. A. MILLS, Baltimore, read a paper, an abstract of which is given below:

PATHOLOGIC CONDITIONS OF THE PHARYNX AND CONTIGUOUS STRUCTURES DURING EARLY CHILDHOOD PRIME FACTORS IN THE ETIOLOGY OF MALFORMED MAXILLÆ AND IRREGULAR TEETH.

The author took the ground, based upon a professional experience of more than twenty-five years, that inflammatory lesions which obstruct or prevent the functional use of the nasal cavities in children between the ages of four and twelve years are in a majority of cases the chief agents in the causation of malformed jaws, and the consequent abnormal alignment of teeth, as well as the beaked or hooked noses so often found in connection with these cases.

The following case was cited: The patient, a male child over seven years of age, presented for dental treatment in the hope of securing relief from pain in the ear and the angle of the lower maxilla on the right side, and which it was supposed might have a dental origin. The patient was pale, haggard-looking, and anemic; the features were contracted or pinched at the angles of the jaws and beneath the malar processes, giving the characteristic appearance of the mouth-breather, or "dog-face," as Dr. Cathell expresses it. There was almost complete obstruction of the nasal passages. There was but one carious spot in a molar which could have no possible relation to the pain complained of, but it was, however, properly filled. An examination of the throat was made, and the tonsils were found to be so greatly enlarged as to almost meet at the median line. The patient stated that deglutition was both difficult and painful. When the tongue was pressed well down with a tongue-depresser, quite a large quantity of yellow pus sprang from an unseen source in the right tonsil; on removal of the depresser the patient exclaimed, "My pain has gone!" There existed a very perceptible contraction of the upper maxillæ on both sides anterior to the first permanent molar teeth, with a decided elevation of the roof of the mouth. The patient was instructed to consult a rhinologist, with the statement that no improvement could be expected until the throat condition had been relieved. Six months later the patient again presented himself, with all the appearance of robust health; the respiration was normal, and, what was of special interest, there was no evidence of the former contraction of the jaws or arch, all of the outlines being perfectly normal. A number of adenoid growths had been

removed by the rhinologist, and the patient was still under treatment with the galvano-cautery for reducing the tonsils.

This important case would seem to demonstrate that either the adenoid vegetations or enlarged or diseased tonsils were the prime factors in the causation of the malformation of the maxillæ, as well as the respiration. If a correct diagnosis had been made and only palliative treatment had been given, there can be no doubt that a typical case of V- or saddle-shaped arch would have developed, with irregularly arranged teeth as concomitants. The parents and grandparents of the patient are full-blooded Germans, and have large jaws and teeth. These cases are frequently neglected, both by parents and family physicians, because of ignorance of the grave results which may develop in connection with them. Usually some simple wash or nasal douche is prescribed which is of no practical value, and the case develops into a chronic form, with all its evil consequences. The starting-point in the majority of cases has its origin in some slight irritation of the throat, especially of the tonsils. Medical and dental practitioners should be on the alert to discover the first signs of any inflammatory manifestations of the throat or nasal cavities of children. Such conditions in their early stages are likely to be overlooked, as they are prone to develop along the lines of the respiratory passages. The early symptoms are usually not sufficiently acute to cause much disturbance, and, if permitted to continue without proper treatment, produce disease and malformation, which in some cases defy all remedial agencies.

When a patient has a slight occasional cough or clearing of the throat, any peculiarity of intonation, huskiness of voice, or nasal twang, an examination should be made to discover the cause, and, when located, treatment should be given at once. The case should be referred to a competent specialist, one fully prepared to make a correct differential diagnosis and prescribe the best remedies. If this be done, we should find fewer cases of malformed maxillæ and irregular teeth in the future than we do at present.

The following expressions of opinion were received as replies to personal letters sent, asking for opinions as to the etiology of malformed maxillæ and irregular teeth:

Dr. John Nolan Mackenzie, Johns Hopkins Hospital, says, "Rhinologists generally hold that the deformities in question are sometimes produced by nasal and post-nasal obstructions (deflection of the septum and adenoid growths being conspicuous examples); indeed, it has been shown experimentally that asymmetrical conditions of the corresponding side of the cranium may be produced in young guinea-pigs by occluding artificially the nostril. Malnutrition must of course be at the bottom of the matter, due probably to defective blood-supply, both in quantity and quality."

Dr. M. H. Cryer says, "It is my opinion that an inflammation of the tonsil and surrounding tissue will cause tension of the palato-pharyngeal and palato-glossus muscles. If this be so, they would naturally pull the lateral portions of the arch downward and inward; especially is this the case with children when their bones are soft and yielding."

Dr. HARRISON ALLEN says, "Probably the most important factor present is oral respiration. Disuse of important functions (instanced here by the nasal passage) invariably excites disturbance. No starvation of the tissues is present in these cases as I understand them, nor is there disease as the phrase is usually implied. I do not think undue pressure of the muscles against the jaws exists, nor are the jaws themselves weakened, except that they may be weakened by having their curves of normal action interfered with."

Discussion.

Dr. E. S. TALBOT said that the thoughts brought out in the paper were radically opposed to the conclusions he had drawn from twenty years' work, and he did not feel that it was possible for him to let the paper pass without calling attention to some of the mistakes it contained. He did not see how such conditions as were described in the paper could have any effect on the maxillary bones. The author of the paper had failed to understand the condition of the child. Even if nothing had been said of the shape of the arch, the condition of the mouth and of the tonsils would prove that the child had inherited a neurotic condition. The mouth and the teeth will almost always indicate the fact when there is abnormal development, and you can scarcely find a patient with adenoid growths or cancer who will not exhibit other stigmata of degeneracy. V-shaped and saddle-shaped jaws are due to the lack of development in the upper jaw. Those who exhibit some of the various signs of degeneracy are very numerous; according to his observations, covering a term of years, more than fifty per cent. of the inhabitants of the large cities would be placed in this class.

Dr. JOHN S. MARSHALL, Chicago, asked if as large a proportion would be found among those who were of what are called pure races as among those people where intermarriages of different nationalities were frequent.

Dr. TALBOT said there would not be so many, though the reason was not because of the absence of mixed nationality so much as the absence of other conditions found in this country that necessitated nervous strain and rapid living.

Dr. A. E. BALDWIN, Chicago, said that it struck him that there was a direct issue between the views expressed in the paper and those upheld by Dr. Talbot. He thought that there was probably truth on both sides, and that local conditions were sometimes a factor in such cases. Systemic conditions may be unfavorable, and in truth it is very difficult to find any one who is physically perfect. Himself in his childhood had been a mouth-breather, but broke himself of the habit by an effort of the will when he became old enough to recognize the fact that the nose was the natural organ for the passage of air to the lungs. The mouth-breathing had not produced any irregularities in his teeth or jaws, yet he believed that mouth-breathing, if continued, will produce irregularities of the teeth and produce abnormality in the shape of the jaw. In fact, we know that local surroundings will change

the position of the teeth and probably the shape of the jaw. He thought there was truth in the premises of the paper and the conclusion drawn from them, and could not always agree with Dr. Talbot's theories about degeneracy.

Dr. MILLS said that the opinions in the latter part of his paper were not his own. Dr. Mackenzie says the condition was caused by malnutrition, Dr. Cryer says by tension; they are probably both right, and he did not believe that this patient could be of the class of degenerates. His parents were both large, healthy people, and the child was usually healthy till it had the grippe. He agreed with Dr. Talbot that many of the people were degenerates, but did not believe that a majority of the deformities of the jaws were caused by inherited degeneracy.

Dr. TALBOT said that the fact that the child had the grippe was a proof that it was degenerate. Being asked to give a definition of a degenerate, he said, "A degenerate is one whose nervous condition is unstable and whose physical condition is abnormal from any cause."

Dr. T. C. STELLWAGEN, Philadelphia, said that the human body was subject to influences which affected it, as a musical instrument is affected when it is out of tune, and whatever caused a drain upon the nervous system would affect the body as a whole. He spoke of a case of a small boy whose feet were subject to swelling when he wore his shoes. This condition was so painful that after running around for a little while the child would throw himself down on the floor, holding his feet up. The consequence was that enough exercise was not taken, and the boy's whole system languished. Proper treatment cured the condition of his feet and led to the restoration of vigorous health. Without doubt, the health of this little patient would have been seriously affected if attention had not been given to the trouble in his feet.

Dr. BALDWIN thought it would not be safe to decide that where there was not absolute symmetry in the two halves of the human frame that there was degeneracy. In fact, it is difficult, if not impossible, to find symmetry, and it would be absurd to group us all as degenerates. Mouth-breathing, whatever causes it, will bring on inflammation of the fauces and nasal passages, and is always liable to bring about abnormal conditions.

Dr. TALBOT said that it was true, as stated by Dr. Baldwin, that the two halves of the human body are seldom, if ever, symmetrical, but these slight departures from symmetry are not taken into account in the study of degeneracy. If a man has an eye one-half inch higher than the other, or one ear one-half inch longer or higher than the other, then these conditions are recognized as the stigmata of degeneracy; but a man can have one or two or even three prominent departures of this nature from the normal and yet not be classed as a degenerate; but if he has more, then he is so classed. About forty or fifty per cent. of my patients might be considered degenerates, and the ways their conditions affect their mentality are numerous. One who makes appointments and habitually fails to keep them, or one who is an habitual liar, would

be considered a degenerate. Degeneracy is produced by any condition which causes an excess or arrest of development; for instance, tumors or the diseases of childhood when severe.

Dr. MARSHALL asked Dr. Talbot what he considered the most common cause of the degeneracy of which he spoke.

Dr. TALBOT answered that inheritance of bad condition of the tissues of the body or nerves. This might be caused in utero, by grief in the mother, or the fact that she lived without the proper amount of fresh air or proper food. After birth any sickness is liable to produce it.

Dr. MARSHALL asked how these influences would cause lying, theft, and the appetite for strong drink and other vicious indulgences.

Dr. TALBOT said that such influences caused arrest or excess of development of the brain tissue, and the person has not the same control of himself that a more evenly balanced mind would give him.

Dr. MILLS said he could not quite grasp Dr. Talbot's definition of degeneracy; it appeared that if Dr. Talbot was right we were all degenerates from the days of Adam.

The subject was passed, and Dr. GEORGE F. EAMES read a paper, entitled

A GLANCE AT SOME RELATIONS OF DENTISTRY TO GENERAL MEDICINE.

Dr. EAMES, in this paper, deplored the lack of wider knowledge among dentists of matters pertaining to the conditions of health and disease, which are liable to influence or be influenced by the condition and treatment of the teeth. He said, if there is one characteristic of the marvelous advance which dentistry as a profession has made, it is the great number of new relations which have been discovered to exist, not only between it and other branches of medicine and surgery, but relations with the arts and sciences. It has been said that the dentist's daily work is largely mechanical; many make it mechanical; many see only the mechanical side of it; for example, the operator may be engaged in plugging a large distal cavity with gold, but this mechanical operation cannot be disconnected from the fact that in some cases of nervous susceptibility the entire organism may sympathize with the local irritation to the extent of shock or nervous collapse. What is the position of the mechanical operator in such a case? In his failure to recognize the vital connection of the teeth with the human organism he has failed to discharge his full duty to his patient, and is guilty of criminal neglect.

A dentist may be called upon at any time to exercise his medical knowledge immediately in cases of nervous spasm, hysteria, syncope, shock, collapse, foreign bodies swallowed, poisoning, hemorrhage, etc., or in a more leisurely way in the consideration of questions relating to stomatitis, adenoid vegetations, malignant growths, operations during pregnancy, and the various inflammatory conditions of the dental pulp and pericementum.

But there are other fields which have not been so fully explored and which are vital to the interests of our profession. Teeth are being lost at an alarming rate on account of the ravages of pyorrhea alveolaris, so called, and this fact alone calls for deep medical research, for a thorough physical examination, including the blood, the salivary and renal secretions, followed by appropriate medical treatment.

In some of my recent cases the personal history has shown no indications of disease, when an examination of the secretions has shown conclusively the existence of abnormal conditions. This shows the necessity of a thorough examination, without regard to the patient's answers or knowledge of his condition.

In order to do this, a most thorough study of the theory and practice of medicine is absolutely required. I can see no other way to meet these pathological conditions in the mouth, believing as I do that they are the expression of some diathesis or other general disturbance. As medical specialists we are facing the serious problem of saving thousands of teeth which at the present time are being lost in spite of the great advance which our profession has made, and it rests with us, as members of the representative medical body of the United States, to use every means in our power to secure the requirement of a broader general and medical education as one of the essential conditions of graduation.

If this be accomplished, it matters not whether the title be M.D., S.D., or D.D.S.; the holder is sure of recognition in any medical organization, and the dental profession will stand for one of the most profound and philanthropic agents of the healing art.

Discussion.

Dr. M. H. Fletcher, Cincinnati, said that he thought those who had charge of the education of dental students should charge themselves with the blame of their insufficient knowledge; still, in all colleges there are students who cannot receive educational training; they have not the ability to profit by the opportunities they have. On the other hand, it is true that many of the professors are not teachers. It is one thing to know a subject, another to be able to teach it; we need an institution to prepare men to teach.

Dr. James Truman, Philadelphia, said that the question of the training of professional men is, perhaps, the most serious question that could be discussed before such a body as this. The ability to profit by instruction is not accidental, and without the foundation of a good education the dental student cannot profit by the teaching he receives as he ought. He agreed with Dr. Eames in advocating medical education for dentists, and thought the dental education should precede the medical course, because the student, by his habit of study during his dental course, would be better fitted to master the medical course. On the other hand, if the medical education was finished first, the manipulative skill so essential in the practice of dentistry would be more difficult to acquire.

Dr. T. C. Stellwagen, Philadelphia, favored every dentist having a medical education, so that in case he should become crippled from any cause, he would have a means of earning a livelihood; but, except for this reason, he believed the study of medicine required in a good dental school was sufficient to meet every need of a dental practice. He thought it very doubtful whether it would be profitable for a dentist to spend the time necessary to take a medical degree. Dentistry is about as far advanced as the other specialties of the healing art. Of course it would be well for a dentist to be educated in every direction,—to be a physician, a linguist, an artist, a philologist, and everything else within reach; but if he spends his time after he graduates acquiring these branches of knowledge he will probably lose the manipulative skill essential to him as a dentist.

Dr. J. L. Williams, Boston, thought that while it was a comfortable feeling that medical knowledge in addition to a dental course was an additional means of earning a livelihood, still it was not a very professional reason for securing a medical education. Every student in dentistry should have a knowledge of the principles upon which his practice is based. There are too many rote practitioners, who do so-and-so because they have been so taught. They should also have been taught the why of the operation. The technical knowledge, the mechanical and manipulative training should be combined with the knowledge of the principles upon which they depend for success.

Dr. A. E. Baldwin, Chicago, said this question affects our section vitally. We are here as specialists in medicine, the same as the other sections. We would think it very strange if any one should suggest that a laryngologist should get his professional education by first attending a school of laryngology and go to a medical school afterward.

It has been said that the dental student can get the needed medical knowledge from the dental school, but the knowledge of the general system should be had before the special knowledge. To get the special knowledge first would be like building the superstructure before the foundation was laid.

Dr. Eames said that the reason for his presentation of the paper was his feeling of the importance of the subject. He is convinced of the need of medical education for dentists, and full of enthusiasm for it. He feels that the subject should be continually agitated. He thought best to study general medicine first and dentistry afterward; that is, to study the principles first and the application of them afterward.

Dr. Wm. A. Mills, Baltimore, found the same fault with medical students as with dental students,—that they learn too much by rote. He spoke of a dentist who found a certain drug beneficial in inflamed gums; when asked what the physiological effect was, he answered, "D—— the physiological effect; it cures the condition, and that is all I want."

Dr. James Truman said that in his experience with a goodly number of dental students who had studied medicine first there

never had been one who took a high average in his dental examinations.

The subject was passed, and Dr. G. V. I. Brown, Duluth, read a paper, entitled

Hyperkinesis of the Muscles of Mastication a Symptom and an Etiologic Factor in Nervous Affections, Particularly Neuralgia of the Trigeminus and Diseases of the Jaws.

An abstract of which follows:

Kinetic action or movement is recognized in contradistinction to trophic action, and indicates in greater or less degree an expenditure of muscular action, also an expenditure of nerve-force. This, within the limit of natural, involuntary muscular action, implies a corresponding increase of trophic action conducive of the condition of health and development, but if the nerve stimulus be over-excited or too long continued, extreme muscular activity will be induced; there is an arrest of structural development; trophic action ceases with correspondingly a loss of vitality and substance. Having these simple and well-understood facts in mind, it is easy to understand why localized symptoms of brain lesion should be, as they are, evident in paralysis and spasms of the muscles supplied with motive force by the nerve-centers affected by the lesion.

A diseased condition capable of producing a spasm may also produce paralysis, and any abnormal muscular activity, particularly confined to certain muscles or groups of muscles, may be taken as an indication of some disturbance of nerve muscular action.

In discussing the symptomatology of nervous diseases writers make frequent mention of both tonic and clonic spasms of the masseter and pterygoid muscles, as in tetanus, epilepsy, lunacy, chorea, etc., while tooth-grinding is a symptom noticed frequently in such nervous disorders as migraine, hysteria, tetany, neuralgia, neurasthenia, paralysis, and neuritis, and, though noticed as a symptom by several authorities, has not been given the full consideration that it deserves.

Tooth-grinding is produced, as we know, by the action of the deeply seated pterygoid muscles, "champing" of the jaws, or the intense unconscious pressure (so frequently disastrous) by the masseter and temporal muscles, all of which are supplied by the motor division of the fifth nerve, and it is to their condition that we must look for information as to the condition of the central origin of the nerve.

Warner tells us, "Tooth-grinding is noted as a symptom common among those who suffer from nervous disturbances, choreic and like affections."

He says further, "Evidence of disturbance of the fifth nerve is seen in the great frequency of tooth-grinding. Ground teeth are very common in nervous children, such as those who suffer from recurrent headaches, restless sleep, somnambulism, and finger-

twitching. In lunatic asylums and wards for imbeciles it is very common to hear tooth-grinding on every side. In such cases tooth-grinding is a sign of central irritation of the fifth nerve."

H. L. Ranney ("Lectures on Nervous Diseases," page 405), describing symptoms of chorea, says speech, mastication, and swallowing may be seriously embarrassed; even the teeth have been known to be broken by uncontrolled movements of the jaw.

Dr. Herman, Hughlings-Jackson, and others also call attention to this in a similar manner as a symptom of these diseases, but I am assured that the widespread influence of the action of these muscles, not only as a symptom, but as a factor in disease also, is by no means appreciated, either among physicians or among dentists, to whom we might naturally look for its more frequent mention.

We note that in the references quoted,—and they might be continued among other writers, *ad infinitum*,—the tooth-grinding and the actions of the muscles of mastication are considered as symptoms of some general or central nervous condition, without apparent reference to the fact that such action might be, and as we know frequently is, an active factor in the development of many pathologic conditions arising from irritation of the fifth nerve and its associates.

It is a common thing, whenever people can be seen in moments of abstraction or deep thought, to see the lines of the masseter muscles and also of the temporal coming into prominence as force is applied, disappearing and reappearing as the action is repeated, perhaps for hours at a time; and such a frequent occurrence is it to note this habit that it passes almost without thought of significance, whereas such a freak on the part of any other portion of the body would be at once set down to some pathological disturbance of greater or less nervous importance.

In my practice as a dentist it has come to me, through years of puzzling experience, to know that the continuance of this effort at night is a frequent cause of reflex irritation.

The movement of the jaw in man, by reason of the freedom allowed at the point of articulation in the glenoid cavity and its muscular governors, differs, as we know, from the lower animals in its capability, not only of the perpendicular movement accomplished in opening and closing, but lateral, transverse, and antero-posterior action as well.

The occlusal surfaces of the teeth, when brought together in the normal arch, are so arranged that each tooth from the lower jaw fits exactly inside and between the cusps of its antagonist in the upper jaw in such a manner that the application of force by the muscles is distributed among the whole number of teeth with comparative equality, save when engaged in the act of crushing and mastication. This muscular force, according to Black, is about three hundred pounds in civilized man, though probably much greater among the savage races unused to modern methods of preparing food; but if, by reason of malformation of the jaw, failure of perfect adjustment, or through slight shifting of its

position in closing, the tips of one or two teeth are brought together instead of the whole number, naturally the effect of the force applied is many times greater than it should be, so that when constantly repeated, as in nervous habit or spasmodic contraction, it is at once evident how naturally must result injury to the extremely delicately organized pericemental membrane surrounding the root, and the communicating artery, vein, and nerve as they pass from the pulp within the tooth to join the main branch of the nerve-supply, either or both of which cause pathologic conditions frequently of a grave character.

The pericemental membrane has great power of resistance and recuperation, but the continued repetition of such undue force must set up an inflammation capable of effecting pathological changes in the highly vascular and neural structure with which it is associated.

The first effect is increased blood-supply, and the bony walls allowing no expansion as the vessels become enlarged, the roots being conical in form, widening from the apex to neck, are pushed a little off the socket, and an aggravating symptom is at once the result, since the crown of the tooth is raised a little above its fellows, and liability to constant irritation is assured.

In the acute form of pericementitis usually the soreness compels notice and forbids biting upon the affected tooth, while the surgical rest thus enforced enables nature to effect recovery, unless the inflammatory condition be the result of too active irritation, as from the pulp-chamber, in which case it may continue to the consummation of an alveolar abscess. In the subacute variety, as in other like affections, the symptoms are less severe, and may proceed to recovery or become chronic. The chronic may present little or no pain upon percussion or pressure, but at the same time may be a painful source of reflex disturbance; may cause exostoses or degenerative conditions favorable to, if not indeed a common cause of, pyorrhea alveolaris and destruction of the membrane.

Thus it can readily be seen that excitement of undue kinetic action of the muscles of mastication may be considered not only as an indication of some disorder of the nerve mechanism, with perhaps tendency to grave trouble, but may actively cause not only reflex pain in the form of distressful headaches, neuralgia, hyperesthesia, anesthesia, and other affections of sensation, but motor as well, and is of important consideration in cases of epilepsy, chorea, and various other neuroses; in diseased condition of the peridental membrane, death of tooth-pulps, alveolar abscess, secondary formations within the pulp-chamber, empyema of the maxillary sinus, and, secondarily, affections of the eye, ear, nose, throat, and stomach also.

To call attention to the clinical aspect of the subject, the following cases are here described:

Case 1.—Mrs. ———. History of pain almost continuously for about two years, excruciating at times, particularly at night; less severe at other periods, extending over right side of face, forehead, and region of the occiput; hyperesthesia so great that the face had not been washed for months;

slightest touch to the surface of the lower lip and cheek would cause intense agony. Teeth were all particularly good; no evidence of caries; arch regular; no apparent sensation to heat or cold applied to teeth; was a slight dullness of sound upon percussion of right upper first bicuspid.

Upon extracting and splitting root, the pulp-chamber was found filled with calcareous degeneration of pulp-tissue and pulp-nodules. Immediately upon its removal all hyperesthesia left the face while the patient was still in the chair. The pain in the head was much relieved, but not cured. A further history of the case, with more recent reports, would seem to indicate that being a typical neurotic, and having, what were termed by herself, "fits" some years before, the force applied to the affected teeth during the spasms, and since, as a result of this condition, during paroxysms of pain, had produced the pulp-degeneration, which, while evidently accountable for the facial hyperesthesia and much of the pain, was really secondary to a condition of some central nerve in conjunction with other motor nerves, and by reason of the undue force applied to the particular tooth affected had caused irritation, leading to the formation of pulp-nodules and calcareous degeneration.

Case 2.—Mrs. S., one child with cleft palate. Suffered pain since eight years old; supra-orbital paroxysm intense; teeth sound; no evidence of caries; on percussion right upper second bicuspid gave a duller sound than its fellows in the jaw; was not sore to touch, but was intensely sensitive to thermal changes.

Upon extraction, the tooth was given to Dr. Evans, pathologist of Milwaukee Medical College, who decalcified it, and upon making microscopical sections found minute growths along the inside of the pulp-canal in the form of spiculæ, extending into the pulp-substance, and though the pain suffered was evidently of an epileptic nature, probably the result of a fall in early life, these growths must have added to the suffering, and were undoubtedly the result of irritation from the intense pressure during the paroxysms, evident by the very noticeable contraction of the muscles of the jaws at such moments.

Case 3.—Miss ———, seventeen years old. A typical neurotic; high contracted vault; irregular teeth, with the usual accompanying symptoms of adenoid growths, catarrh, etc. History of almost continuous pain for a period of two years; sometimes on one side of the face and head, sometimes upon the other; occasionally bilateral, varying in intensity at different periods.

The pulps of seven teeth in both jaws were evidently hyperemic, and extremely sensitive to thermal changes. Where large amalgam fillings seemed to have excited undue irritation, the pulps were devitalized, an extremely painful process, only relieved by grinding down the crown of each tooth so that it could not touch its antagonist when the jaws were closed.

This was, in fact, the only thing that was found to give relief, and one after another the crowns of the affected teeth were ground down, so they could not strike in occlusion. This would give freedom from pain for perhaps a number of months, and upon a return of the pain some tooth would always be found to be slightly elongated. Again grinding would relieve for another period. It is of interest to note that when this patient became overtired, particularly with social efforts, she would frequently awake in the morning, after a night of disturbed rest, with a sense of numbness in the teeth and jaws, due undoubtedly to a severe pressure, or would be awakened by the return of severe pain.

About the time of the beginning of the trouble she had become engaged to be married. The engagement was afterward broken. Then another young man was affianced to her. This was also discontinued, and during this interval of several months but little or no trouble was experienced. Recently, however, the third engagement was coincident with a return of the trouble, and upon close questioning it was disclosed that after spending an evening in the young man's company much difficulty was experienced in getting asleep. Therefore, our conclusions are that in this case the motor branch of the fifth nerve was excited in sympathy with sexual excitement; pressure upon the individual teeth was intensified by irregularity in the conformation of the arch, and this irritation was communicated to the

sensory portion of the same nerve, with the usual painful result. Instead of grinding, I have for some time past tied over the crown of one of the unaffected teeth a piece of rubber-dam, so that the jaws cannot be brought tightly together. Relief is complete after a few hours, or, if applied in the night, next morning the rubber can be removed, and the difficulty is completely averted for the time.

Case 4.—Mr. ———. Much annoyed with slight tinnitus aurium on left side; no evidence of local oral or eustachian trouble, as testified by several aurists; teeth much abraded; has been much relieved by treatment and grinding off morsal surfaces of several teeth.

An occasional slight return of his aural trouble is generally relieved by removal of some occluding portion of the left upper central incisor, which seems to be particularly in sympathy with the ear at this time.

Case 5.—I have under my care at present a woman of about forty, whose incisors are worn almost beyond recognition of their natural form; tendency to intense mental excitement upon slight provocation, particularly on subjects of politics, dress reform, etc.; suffers from a difficulty of the right lower extremity, threatening at times loss of sensation and motion.

After typhoid fever or other unusual drain upon the natural forces there seems to be a tendency to develop this habit of the jaws, and in many instances pain in the head and face has been relieved in my practice by removing the possibility of continued irritation in the manner before described.

The fact that there is seldom soreness on percussion of such teeth makes diagnosis frequently difficult, and doubtless accounts largely for its not having been considered, as it should have been, as a diagnostic indication, but the surfaces of fillings in abraded crowns of teeth, or a dullness of sound on tapping with a metallic instrument, will often serve to indicate, in the absence of other and more marked symptoms of pericemental inflammation.

The very great frequency of complications from this habit in cases of pyorrhea alveolaris, for which over and over again—almost, in fact, a daily occurrence—I have relieved the discharge about the necks of teeth and have hastened the retightened process of those loose in their sockets by grinding down to relieve unusual force in occlusion, and its very common association with tenderness and pain following the process of devitalization of pulps, require consideration far more frequent among dentists than has hitherto been. In the field of medicine, as a symptom of some neural disturbance of kinetic function or the direct excitant of some pathological condition, the study of any abnormal activity of the muscles of the jaw is of far greater importance than is generally realized.

Discussion.

Dr. E. S. Talbot, Chicago, said there were two conditions of the nervous system in which these symptoms appear, though they vary in the two conditions. Individuals who are actively engaged in mental work suffer to a far greater extent than do those whose labor is of the body. The condition is also common among the insane, but these do not suffer so much from the effects of the habit. In dealing with such cases as Dr. Brown has described, we need to exercise the greatest kindness and patience, as the intense pain suffered renders the patient very nervous and despondent.

Dr. E. C. KIRK, Philadelphia, said he apprehended the essayist to hold that the relation of cause and effect existed between the hyperkinesis of the muscles and the painful conditions of the jaws and teeth described. We all know that any irritation of the pericementum will provoke grinding of the teeth. Any one who has suffered from incipient pericementitis will appreciate the fact that temporary relief is produced by bringing the teeth firmly together, thus reducing the engorgement of the membrane by forcing out the excessive blood-supply. He could not understand how a case of antral empyema could be produced by grinding the teeth together, as he had supposed empyema of the antrum had a specific cause. In cases of reflex neuralgia caused by irritation of the pericementum we find the same inclination to press and grind the teeth together, but this habit is not the cause of the neuralgia, but a result of it. Dentists usually, when such cases come to their hands, are inclined to turn them over to the physician, as they are difficult to deal with, and the source of the trouble is often almost impossible to determine.

Dr. BROWN thought that perhaps Dr. Kirk had not followed the beginning of his paper, where he laid the groundwork of his deductions. He believed that the action of the muscles preceded the inflammation, and in the case described it appeared to have done so, and, when the teeth were put in such condition that they could not be forced together, the inflammation and pain ceased without other treatment. His experience had shown him that inflammation of the pericementum would cause empyema of the antrum.

Dr. JAMES TRUMAN, Philadelphia, thought it an error to say that grinding the teeth was caused generally by inflammation of the pericemental membrane. He knew people who have no pain or trouble of any kind with their teeth, but who grind their teeth continually to such an extent as to wear them away. He would like to understand the cause of the habit.

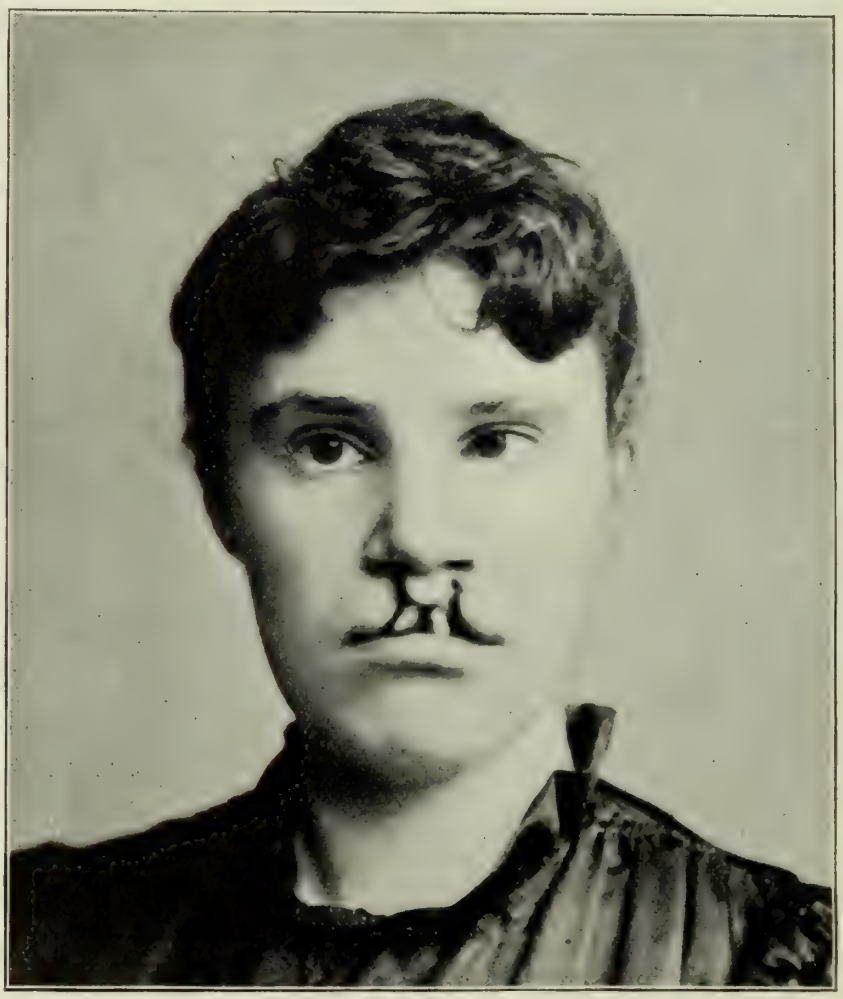
Dr. KIRK did not wish to be understood to assert that pericemental irritation was the cause of all tooth-grinding, though he did believe that in nearly all cases of beginning of pericementitis, grinding the teeth together and exerting pressure upon them would be instinctively indulged in for the temporary relief the practice would give.

The subject was passed, and Dr. GEO. T. CARPENTER, Chicago, described the following case of hare-lip and operations for same:

The patient, a lady twenty-two years old, had suffered from birth with double hare-lip, also cleft of both hard and soft palate, which was very large, but nature had largely overcome this latter defect by hypertrophy of the inferior turbinated bodies, and, in consequence, the voice, though not good, was much better than many with a very slight opening in the hard palate or bifurcation of the velum. But the deformity of the lip did not improve. The patient was well developed, strong, and healthy. She had always lived in the country. Owing to her mother's opposition to surgery the lip was not operated on. The lady was of a healthy and

well-developed family. The mother died a few years ago from an accident. She suffered from no physical defects. She came to Chicago, and I was consulted and an appointment made for July 28, 1896, at which time Figs. 1 and 2 were taken, after which I made a careful examination and found that five anterior teeth were very irregular and badly decayed, the two centrals being movable on account of the loose intermaxillary bones; the cuspids were irregular, but sound. I also took a sectional impression of the upper mouth. I then used local applications of ten per cent. aqueous solution of cocain and removed seven teeth, one of which

FIG. 1.



was a supernumerary. As soon as the gums were healed a rubber plate with six anterior teeth and soft rubber velum was inserted, and on September 15 we operated on the lip. The operation was performed under ether. We first removed the mucous membrane, with considerable tissue, from the central teat-like projection. We then passed a lancet through the lip of each side, and cut upward and toward the median line to the extreme upper angle of the cleft. Adhesions of the lip and gum were also freely separated by the use of the knife; then turning the flaps down (the assistant pressing the cheeks well forward), the surfaces of the flaps were made to come together. Three deep cat-gut stitches were taken in the under side of the lip. The margin of wound

was then neatly placed in position and secured by a few fine stitches. Cohesive strips of English moleskin were placed on each cheek, which were allowed to extend to corners of mouth and turned under, so as to leave free the anterior ends, which had holes punched for lacing. The surgical dressing was powdered iodoform, covered with ten per cent. iodoform gauze. The cohesive strips were then laced tightly, so as to bring the cheeks well forward and relieve all tension on the stitches. Dobell's solution was used as a mouth-wash. The lacing was removed and the

FIG. 2.



wound examined each day for a week. The fine stitches were removed the third day, and deep stitches the sixth day. We had union by first intention. The patient was dismissed October 12, upon which date the photograph Fig. 3 was taken.

There was no discussion of Dr. Carpenter's paper, and in the absence of the author, Dr. A. E. Baldwin read a paper by Dr. W. E. WALKER, Pass Christian, Miss., "Upon the Use of the Sterilized Roots of the Teeth of Animals as Supports for Porcelain Crowns."

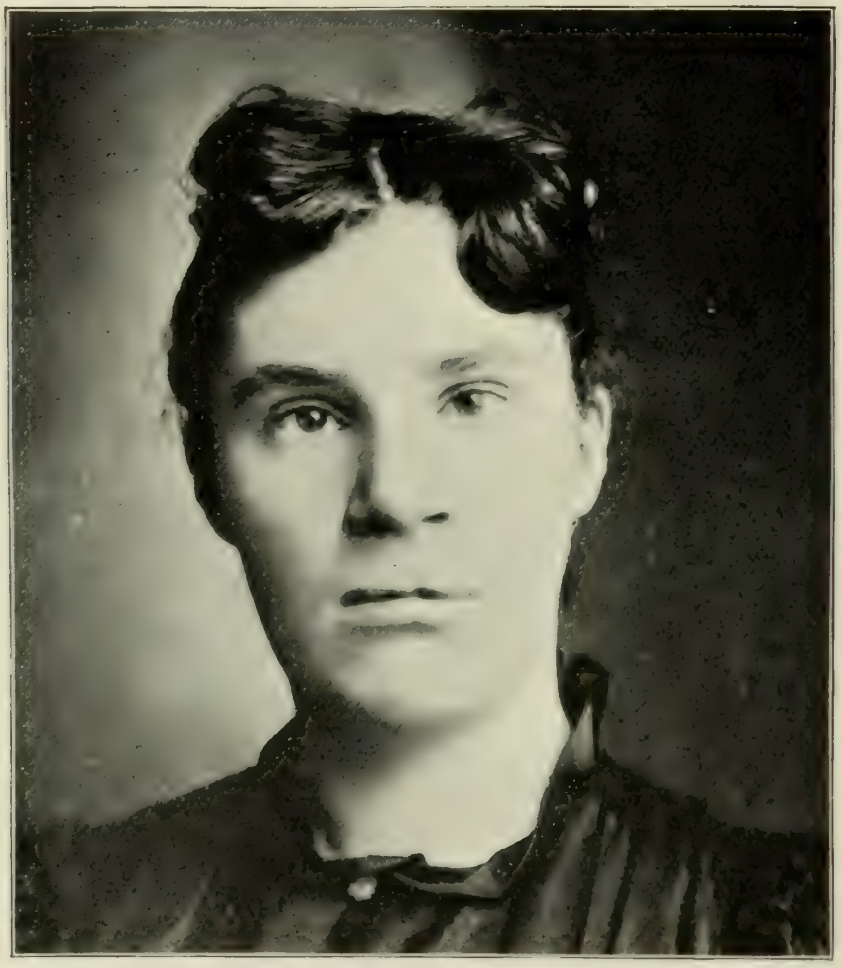
An abstract of the paper follows:

Since the introduction of the operation of implantation by Dr. William J. Younger (1885), various substitutes for carrying arti-

ficial crowns, as lead capsules, porcelain teeth, double staples of metal reversed, etc., have been suggested. The literature on the subject does not indicate any marked degree of success with any of the roots save natural ones.

As it is often a difficult matter to obtain a healthy root of a human tooth suitable for this purpose, it has occurred to me that we might utilize the roots of the teeth of animals, which are easily obtained from the slaughter-pen, and which are, as a rule, free from disease, requiring, however, thorough sterilization. Before

FIG. 3.



implanting, they can be surmounted with Logan or other crowns, a cast made of the mouth, and a bandage made on it by Dr. Jack's method, which I have found the most satisfactory. While I have not found any animal's teeth with roots very closely corresponding to those of human molars, this is immaterial, as the socket from which a molar has been extracted requires remodeling even to receive a human molar, for the roots of no two human molars are alike, and less cutting is necessary in using the large single root of a bovine central incisor, all that is demanded being the removal of the septum dividing the alveoli of the socket. I have examined a number of heads, and find that while bovine centrals are very well developed and admirably adapted to this purpose, it is not so with the lateral incisors at the age at which beef is usually

slaughtered in this section of the country, the root of the lateral not being fully developed and the foramen very large.

This is not, strictly speaking, *implantation*, but a practical *transplantation*, which might be practiced by some who are hesitating to drill sockets in the molar region for implantation, or who might be deterred by the difficulty of inserting a multi-rooted tooth. Any necessary variation in the procedure from what has been published on *im-* and *trans*plantation will naturally suggest itself to any one who will take the trouble to review the literature of the subject before undertaking the operation.

Discussion.

Dr. M. H. FLETCHER, Cincinnati, did not believe that the operation advocated in the paper would be successful, and called attention to the fact that the author had not given any accounts of successful cases. He himself had gone through a series of experiments in implanting the teeth of small dogs in the jaws of goats. In all he had thus transplanted nine teeth, taking every measure to insure success that he would in transplanting teeth in the human subject. The result in eight of the nine cases was that the roots were absorbed and the teeth came out. In the ninth case there was a partial ankylosis. Upon examination, after a considerable time he found three-fourths of the root absorbed, but one-half of the length of the root was attached to the jaws. His conclusions were that unless in implanting a tooth you have the conditions of a fracture, you will necessarily have resorption of the root, which will be practically a foreign body. If you had a pericemental membrane to protect the root, it might succeed, but in the operation described in the paper he would predict absolute failure.

Dr. JOHN S. MARSHALL had replanted a great many teeth after extracting them and filling the roots, and up to a few weeks had never had a failure. The one failure was a tooth he had replanted thus about eight years ago, which recently received a blow which caused inflammation about the root, and this brought about resorption of the root. This was his one failure; still, he did not think eight years of service was very bad.

Dr. A. E. BALDWIN, Chicago, said that when, in 1887, Dr. Younger demonstrated his plan of implantation, he expressed his belief that teeth so implanted would not stand, but Dr. Younger asked him to give it a trial, which he did, but with failure as a result. It cannot be a success, or we have to unlearn everything we know of physiology. He believed firmly and conclusively that it is an impossibility.

Dr. C. M. CARR said he had done as much implantation of teeth as any man, with the exception of Dr. Younger, and he was fully convinced that the operation deserves more respect than it has been given to-day. All implanted teeth are not failures, as he has cases which have been useful for over ten years. He thinks many made mistakes in the selection of teeth for implanting in selecting young teeth. These are the ones which are absorbed; when old

teeth are implanted they remain. Of fifty-four teeth he implanted last year, fifty-two were successful.

The subject was passed, and after the transaction of some matters of routine business the section adjourned to meet at the next annual meeting of the association, in Denver, in June, 1898.

American Dental Association.

(Continued from page 757.)

Second Day—*Morning Session.*

The association was called to order at 9.45 o'clock A.M.; the president, Dr. James Truman, of Philadelphia, in the chair.

A communication from the Southern Dental Association inviting the members to attend the clinics of that association was received and accepted, and an invitation was extended to the members of that body to attend the sessions of the American Dental Association, with the privileges of the floor.

Dr. H. A. Smith, from the Credentials Committee, to which had been referred the charges against Dr. W. P. Horton, of Cleveland, of unprofessional conduct, reported that Dr. Horton had made no effort to refute the charges, and they therefore recommended that his name be dropped from the rolls. So ordered.

Section V, Materia Medica and Therapeutics, was passed.

Dr. J. N. Crouse, Chicago, moved that, in the absence of Dr. Harlan, who was appointed last year to deliver an address at this hour on "Miasms and Infection," the address of Dr. Cassidy should now be heard. So ordered.

Dr. J. S. Cassidy, Covington, Ky., then read the general address which he had been appointed to prepare, entitled "The Relations of Chemistry to Dentistry."*

Dr. W. C. Barrett, Buffalo, N. Y., commended the address as a valuable contribution. We don't learn much from the man who agrees with us, but we do learn from the man who points out our shortcomings and tells us where we are mistaken.

Dr. W. St. George Elliott, New York, also commended the paper, and would like to ask Dr. Cassidy what he thought of Dr. Black's statement that the density of a tooth has nothing to do with its resisting power to the attacks of caries.

Dr. Cassidy. Density means specific gravity, and the specific gravity of a tooth can probably have nothing to do with its resistive power. If Dr. Black means that, he is unquestionably right.

Dr. J. Taft, Cincinnati, thought the paper went to the pith and marrow of the subject. This body would do well to encourage such efforts.

Dr. H. A. Smith, Cincinnati, could only commend the paper. Dr. Cassidy, in making a statement, is always careful to be on solid ground. The statement made in the paper which had at-

*This paper was printed in the Dental Cosmos for October, page 800.

tracted his attention most particularly was that with relation to the method of disintegration of cement fillings at the cervical borders of the teeth. We hear it said frequently that cement fillings last as well at the cervical border as elsewhere. Dr. Cassidy accounts for this disintegration by alkaline action at that point. He says that the reaction at the cervical border is alkaline; that ammonia is developed at that locality, which dissolves away fillings of the kind known as oxyphosphate.

Dr. J. D. PATTERSON, Kansas City, Mo., had found that students, a great many of them, at least, have a dread of the study of chemistry; why, he did not know, unless it was because few dentists are teachers of chemistry. He had found also that students who were graduates in pharmacy who were good chemists made the best kind of students of dentistry. He thought that the National Association of Dental Faculties did a good thing when they decided to give the pharmacy men credit for one year in their dental studies. If it is proved by experience that the oxyphosphates do disintegrate at the cervical borders through alkaline reaction, Dr. Cassidy's statement will be substantiated. The speaker's experience does not corroborate it. He has made tests out of the mouth, and many experiments, and his observation was that if the cement was properly mixed no alkaline product found in the mouth would disintegrate it.

Dr. H. A. SMITH doubted that we could get the conditions outside of the mouth that we have in it. He has not tried any experiments, but he has found that cement fillings do disintegrate at the cervical border,—that if a filling fails from chemical reaction it is at that point. It may waste away at other places, but not from chemical action.

Dr. CASSIDY. The distinction between putrefaction and fermentation is a distinction without a difference. Putrefaction is alkaline fermentation, while what we call fermentation is of an acid nature. Both depend upon the action of bacteria upon extraneous matter. All fermentations, if we restrict the term, end with the formation of an acid. Putrefaction is the term used to indicate a nitrogenous action, which involves the production of ammonia and its derivatives. Experiments out of the mouth, while they do not prove exactly the same reactions that occur in the mouth, prove certain facts. We must acknowledge that ammonia is developed in the mouth by alkaline or putrefactive fermentation. Now, if we put an oxyphosphate filling, carefully prepared, into a tooth out of the mouth, let it stand in a dry place till thoroughly set, and then put it into a five per cent. solution of ammonia over night, we shall find the filling disintegrated, the oxid of zinc precipitated, and the phosphoric acid united with the ammonia. Is it not clear that if ammonia is developed in the mouth this reaction will take place in an oxyphosphate filling put into that mouth?

Dr. BARRETT was glad to have the line drawn so clearly between putrefaction and fermentation. There has been too much loose construction of the terms. We have commonly understood that putrefaction is a destructive fermentation with the evolution of

offensive products, due, of course, to the nitrogenous products evolved. But the line between putrefaction and fermentation has not been drawn clearly. The organisms which produce them are of different classes, but they all belong to the fungi, and to the same general classes of fungi. The inorganic or digestive ferments are of an entirely different character.

Dr. H. A. SMITH would like Dr. Cassidy to make a little more clear the reason why the disintegration of these fillings at the cervical border is so general as compared with their disintegration at other points; why it is that we have the alkaline product of putrefaction at this locality rather than at others? Why do the nitrogenous foods collect here? An oxyphosphate filling is worth scarcely anything under the gum-margin.

Dr. CASSIDY. In such cases the finish of the filling has a great deal to do with it. If a little roughness or imperfection is allowed to remain in a filling under the gum-margin, it sets up an inflammation of the gum. The process of fermentation, called putrefaction, follows, and the characteristic ending of putrefaction is the production of ammonia or some of its derivatives. The ptomaines, for instance, those poisonous alkaloidal bodies, are developed at that point more than elsewhere,—probably more by the inflammation in the gum than from the *débris*, or food or mucus which may lodge there.

Dr. BARRETT called the attention of Dr. Smith to the white, cheesy deposit of Miller,—the soft mass found at the gingival margins of the teeth. The disintegration of this mass, by putrefaction or fermentation, may produce an acid or an alkali, according to which process prevails, and would seem to account for the change referred to.

The subject was passed.

Dr. PEIRCE moved that the order of business be changed to give Section I precedence over the section on the regular order, to permit Dr. Case to read his paper at this time. So ordered.

Dr. CALVIN S. CASE, Chicago, read a paper, entitled "Principles of Force and Anchorage in the Movement of Teeth."*

Evening Session.

The association was called to order at 8.20 P.M.; President Truman in the chair.

After the proceedings, with reference to the proposed union with the Southern Dental Association, reported at page 756, DENTAL COSMOS, for September, the vice-president, Dr. Fillebrown, took the chair, and the committee on the president's address made its report, as printed at page 753 of that number.

Dr. GRANT MOLYNEAUX, Cincinnati, Ohio, as a supplement to the report, made an address, eulogistic of the president, to which the president replied briefly.

*The publication of this paper, with the discussion which followed it, is delayed for the proper execution of the necessary illustrations. It will appear in a later issue of the DENTAL COSMOS.

The report was then made the special order immediately on convening in the morning.

Dr. TRUMAN resumed the chair, and Section IV, Histology and Microscopy, was called.

The report written by Dr. I. P. WILSON, Burlington, Iowa, secretary of the section, was read by Dr. Cushing, as follows:

This section on Histology and Microscopy has sustained a great loss during the past year.

Dr. Frank Abbott, who has been chairman of the section every year, with two exceptions, since the establishment of this branch of study in this association, has passed away.

On examining the transactions of this association, I find that the first researches ever conducted in this country, to determine the etiology and progress of the carious process in human teeth, were conducted by Dr. Abbott in 1878, and I learn also from the records that nearly every pathological condition found in these important organs has been microscopically studied by him, and the results obtained have been from time to time reported to this association. Only twice since the establishment of this section has he failed to contribute a valuable paper.

Dr. Abbott has kept this section alive. In 1894, at Old Point Comfort, he was the only member of the section present. But he realized, as we all must, that the wealth of this comparatively new field of research has not been exhausted, and has yet in store for us rich fruitage.

Only a short time before his death he wrote me an earnest letter regarding the work of this section, and expressed a desire that we secure, if possible, a greater interest in this important line of investigation.

The transactions of the American Dental Association for a score of years are richer because of his untiring researches.

If the pages of our dental journals are to be regarded as an index to the histological and microscopical investigations of the past year, but few have been engaged in this line of study. It is with pleasure, however, that we call attention to a paper, read before the New York Odontological Society last January, by Dr. J. Leon Williams, London, Eng., it being "A Contribution to the Study of Pathology of Enamel."

This paper, illustrated by about one hundred photo-micrographs, was published in the DENTAL COSMOS of March, April, and May of the present year, and should be read and carefully studied by every member of the dental profession.

This paper certainly marks an epoch in the development of dentistry. While it is true that Dr. Black had in some sense foreshadowed what Dr. Williams has brought out regarding the influence of films formed by micro-organisms, it has remained for Dr. Williams to demonstrate it. This clear demonstration by Dr. Williams fully merits the credit of discovery. His study of the teeth, with reference to their liability to caries, is also very important, especially the studies of the condition of the enamel.

One paper only has been secured for this section, by I. Norman Broomell, D.D.S., Philadelphia, entitled "Macroscopic Tooth-Development," illustrated with lantern-slides from original dissections.

A committee, consisting of Drs. J. D. Patterson, W. H. Richards, and H. B. Noble, was appointed to audit the accounts of the Dental Protective Association. The committee, at a subsequent session, reported that they had found the accounts and vouchers correct. The report was accepted and placed on file.

The special order of the evening, a lantern exhibit and paper, by Dr. I. Norman Broomell, Philadelphia, was then taken up.

Dr. Broomell read his paper, which was entitled "Macroscopic Tooth-Development."*

The paper was illustrated by a large number of lantern-slides.

A vote of thanks was tendered to Dr. Broomell, on motion of Dr. John S. Marshall, Chicago.

Adjourned till 9 o'clock Thursday morning.

Third Day—*Morning Session.*

The association was called to order at 10.05 A.M.; President Truman in the chair.

Dr. J. Taft, Cincinnati, Ohio, chairman of the Committee on Necrology, read the report, which chronicled the death of five members of the association: Drs. Frank Abbott, New York City; Francis Peabody, Louisville, Ky.; Seneca B. Brown, Fort Wayne, Ind.; Eli Slegel, Reading, Pa., and William N. Morrison, St. Louis, Mo.

The report and the resolutions accompanying it were adopted, on motion of Dr. Barrett.

The consideration of the report of the Committee on the President's Address was postponed till a later hour, and Dr. Broomell's paper was declared open for discussion.

Dr. C. N. Peirce, Philadelphia, Pa., considered the exhibition made by Dr. Broomell very successful, but not one of a character to call out much discussion. It brought to his mind the contest over the theory of development which occurred some two hundred years ago. When Harvey, the discoverer of the circulation of the blood, had finished that work, and Leuwenhoek had invented the microscope, Harvey, in 1651, procured one and took it into his laboratory. He then set a hen upon eggs, and every day during the period of incubation, twenty-one days, he broke an egg and made a record of the changes shown by the microscope. When the experiment was completed, he declared to the scientific world that syngenesis, the already formed, was not true; that epigenesis, to be formed, was true. The scientific world and the clergy resisted this attack upon the existing order, and he was not allowed to publish the results of his investigation. His drawings remained hidden for more than a hundred years. In 1759 Friedrich Caspar Wolff took up the subject, and demonstrated that Harvey was

*See page 881, current issue.

right. He went through the same experiments, taking only the alimentary canal, and showed the changes from the beginning to the end. Every effort was made to crush him. Everybody said syngenesis was right, and epigenesis was wrong; that the animal was formed complete in the egg. Haller declared that Wolff's statement was rank heresy; that every animal was created in the beginning, and that the number was necessarily limited. He even said that there were 200,000,000,000 perfect human beings in Mother Eve's ovaries, and that when all those were born that would be the end of the human family. This was published in 1728. Wolff taught the truth of epigenesis for thirty years. It was not until 1759 that he could get the physiologists of his day to recognize the truth of Harvey's work, confirmed by his own. So to Harvey first, and to Wolff afterward, are we indebted for the theory of epigenesis, which we to-day accept, and which was so beautifully illustrated by Dr. Broomell. The organ was to be developed, not already developed. The origin of the old Spanish custom of giving the mother's name to the child was evidently the belief in the old theory of syngenesis; the mother was the only parent concerned; the father only stimulated the development of the child. And perhaps it was also the foundation of the idea held by many to-day, that acquired characteristics cannot be transmitted.

With reference to the exhibit last night, Dr. Peirce did not know that those who witnessed it recognized how difficult it was to show the development of the enamel. Only the space where the enamel-germ existed was shown. Dr. Broomell tried hard to get a photograph of that structure forming, but the very moment he exposed the stellate reticulum, which was instrumental in producing the calcoglobulin, the hardening material of the enamel, it shrank and could not be shown, and only the space it had occupied was seen. Those who have examined cut specimens of enamel-fiber or enamel-structures find that the case in nearly all instances. Dr. Broomell is entitled to great credit. Intense and persistent labor was involved in the preparation of his specimens. We have never before had an exhibition of this kind, giving in its entirety the development of the teeth. We have had sections, slides, etc., showing the development of portions, but never before an effort to show that of the whole tooth.

The subject was passed.

(To be continued.)

UNION MEETING OF THE MARYLAND STATE DENTAL ASSOCIATION, WASHINGTON CITY DENTAL SOCIETY, AND VIRGINIA STATE DENTAL ASSOCIATION.

(Continued from page 852.)

Discussion of Paper on Dental Education.

DR. WILLIAMS DONNALLY thought the Committee on Education one of the most important of all, and that the subjects were very

fully treated in the report and the two papers. The duty of the profession to support these colleges which were doing what was possible to sustain the highest standards was plain, and no effort to persuade them to perform that duty was to be neglected. He was glad to know that preliminary examinations had been advanced and with good results.

The National Association of Dental Examiners has not assumed the duty of fixing the standard of the college courses, but it has taken the highest standard colleges as the best that could be had at the present time, and has endeavored to bring all of the colleges up to the level of the best. The Association of Faculties has worked with the Examiners in harmony usually, and our aim has been, and is, to bring the two associations into closer harmony.

Dr. W. A. MILLS, Baltimore, said there seem to be two classes of men in the profession; one is content to stay just where they are, and the other ever strives to go forward and be better than mere dentists, as the word is commonly understood. To raise the dental profession in the eyes of the public it will be necessary that the members have that better education which will place them upon a worthy professional footing. Study will alone give this, not study only while preparing for college and while passing through college, but the habit of study that makes one a progressive student through life. When we look back twenty or thirty years at what dentistry was then, and look forward to what the same rate of progression will make it in the future, we can see that we will then be classed not only as professional men, but as scientists, and this is what we should resolve to be.

Dr. L. M. COWARDIN agreed with Dr. Mills that the dental profession of to-day was in embryo, but it has lost the connecting cord. We should return to the mother profession, medicine. Why are we to-day classed as mechanics? The Supreme Court of North Carolina said the dentist is a repairer of human teeth, but does it say that the physician is a repairer of the human system?

What will be necessary before we have fully educated dentists is for the dental colleges to require every one who comes to matriculate to have the same education that is required of one who would prepare himself as a specialist in gynecology or in ophthalmology; that is, a full medical education. He would rather be a professor in a medical college teaching the specialty of dentistry than in a dental college. His desire was to have the dental students stand the same examinations as the medical students, and when they come to the dental department they would be taught the special branch of dental work.

Dr. STEEL spoke of the duty of the profession to the colleges. He said we get together in our societies and talk in a high-toned manner of the necessities of the profession, and what the colleges should do for the profession, and what the profession should do for the colleges; but many will go home and advise their own students to select the school that will be easiest for them to get through.

Dr. THOS. FILLEBROWN said the subject of dental education was very near to his heart. He was in favor of adopting a standard in

every college that would place dentistry among the ologies, as gynecology, dermatology, etc., and favored the use of the word stomatology as describing its field. There is not a single medical college which does its duty to its students. If it did it would send them out upon graduation fitted to practice a chosen specialty. This it does not do. Before a graduate is qualified to practice a specialty he must devote two or three years to special study after graduation. This is not fair. He should be graduated fitted to practice the specialty he has chosen, and stomatology should be one of the specialties so taught. He favored the granting to all graduates of the single degree of M.D.

Dr. DONNALLY would like to see the dental and medical profession more closely united, but expediency forbids. The idea which lead to the separation of the two professions has been operating for years. The degree of D.D.S. from the better dental colleges of this country is as high a degree as the M.D. from the medical colleges of equivalent standing. It costs as much time, as much brain, as much hard study, and as much concentration of mind and effort to acquire it. More than this, the holder of the D.D.S. is better qualified to practice his specialty than are the specialists in any other branch of the healing art.

The new name for the organization that is to represent the profession of every part of the country should be distinguished by some other word than dentist or dental. The word stomatologist or its equivalent should be used.

Dr. H. B. NOBLE, Washington, said that in the District of Columbia the dentist had been officially accepted as a physician. The courts were forced to acknowledge our claims to this classification. When he had been summoned to serve as a juryman he had claimed exemption on the ground that he was a surgeon, and although the claim had at first been laughed at, yet when he proved that he held the same diploma as that held by the man whom the Surgeon-General of the army and navy had called upon to perform the operation that saved the life of Secretary Seward, at the time Lincoln was assassinated, the claim was allowed. The Surgeon-General of the United States did not know how to treat Seward and sent to New York for a dentist, who came and treated the case, and cured it, too. Now this dentist was a graduate of the same dental college in Baltimore where I graduated, and the court had to admit that the man whom the chief surgeons of both the army and navy had to call in to treat a case which they could not save was worthy of being classed as a surgeon.

The subject was passed, and H. W. CAMPBELL, of Suffolk, Va., chairman of the Committee on Pathology and Therapeutics, introduced Dr. WM. A. MILLS, of Baltimore, who read the following paper:

ACTINOMYCOSIS IN MAN.

In view of the fact that actinomycosis or ray-fungus is so frequently discovered in the human subject, and when found in connection with the maxillæ or associated tissues has been in many cases diagnosed and treated as alveolar abscess, especially when the

pain seems to have its origin in a carious tooth,* I desire to say a few words upon the subject, with the hope that they may be to us as dental practitioners both interesting and instructive, so that if at some future time we should be called upon to deal with such a case we may know how to diagnose and treat.

The disease produced by this most remarkable mold† parasite was very imperfectly understood until 1876, when Dr. Bollinger discovered it to be of microbic origin. When found in cattle, and the seat of the disease is in the jaws, it is known as wen, sarcoma, malignant tumor of the tongue, or "wooden tongue." It is also found in the tongues of horses and the mammary glands of hogs.

In the human subject it causes abscesses in the lungs, pus in the pleural cavity, etc. When found in the bones of the spinal column it produces "cold abscesses," which open by spontaneous suppuration, discharge their liquid secretions, then, healing rapidly, refill and discharge as before, until their existence is terminated, as a German authority puts it, *mit Schwerdt und Feuer*,—or in plain English, by the surgeon's knife and the electric cautery.

The manner in which actinomyces may enter the system is similar to the mode of invasion of many other microbes, *i.e.*, through accidental scratches of the skin, mouth, or pharynx, by wounds, or inoculation. In cases of supposed alveolar abscess the point of entrance is supposed to be via diseased gum-tissue. A case is cited where mediastinal actinomycosis was caused in a man, and traced to the perforation of the back of the throat by a barley spike. This peculiar fungus leads a hyperphytic life upon barley and similar cereals. Huppe has succeeded in artificially producing actinomycosis in rabbits by inoculation.

When actinomycosis is found in man, in the matter discharged from the tumor small yellow points may be seen on examination with the microscope, but to the unaided eye they appear as green or greenish-yellow grains, varying in size from a mustard-seed to that of a split pea. The pus discharged has an exceedingly characteristic appearance, being of a peculiarly slimy consistence, in which are found the green points which are specially diagnostic of an actinomycotic condition.

These small green points when found in the cow are frequently gritty, this being due to the deposit of calcium-salts in the core; but in man they are usually cheesy or wax-like.

Woodhead says, "If, on examining one of these tumors with a low-power glass, it will be observed that it has a well-marked fibrous net-work; especially as on section the softened caseous center gives way,—in the softened material the star-like organisms may be found. On examination of the fungus under a high magnifying power the organism is found to be like the capitulum of a daisy, the sterile flowers in the center corresponding to the club-shaped rays.

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*Dr. Murphy, Chicago, Ill., reports three cases treated.

†Dr. Murphy claims this microbe is *not* a fungus, but belongs to the highest bacterial class called Cladothrix and suggests for it the name of Actine-cladothrix.

"The club-shaped rays, however, are not all simple, but in some cases branch dichotomously; sometimes irregular compound clubs are thus formed. If we can conceive of two or three of these flowers as placed base to base, or stalk to stalk, we may obtain an idea of the ray-fungus as a whole."* (See diagram.)

The treatment for actinomycosis is the radical extirpation of the entire mass, which can easily be done where the seat of the disease is situated in the lower jaw, as the tumor becomes detached from the bone by the assistance of nature. Where radical extirpation is impossible, curetting will prove efficient if care is taken to follow the sinuses to their extreme ends, and going over the scraped surfaces with fire. The majority of cases not to be reached by the surgeon's knife terminate fatally, except in rare cases, where the fungus dies for lack of suitable pabulum. Its growth is very slow except in the peritoneal cavity, causes very little pain, and no elevation of temperature. The greater the amount of suppuration,



the more rapid and malignant the disease. Fatal symptoms manifest themselves very slowly, due principally to the very great connective tissue-infiltration, barring the progress of the disease. The limits of its invasion can be followed by the golden yellow of its slough. Medical treatment up to the present time has proved a failure.

In conclusion, we cite one case of actinomycosis in man, the following being the substance of a translation from the French of a very long clinical report made by Dr. Guillemot, Thiers, France, entitled "A Cutaneous Actinomycosis of the Left Cheek:"†

A man twenty-three years old, while assisting a market man to raise a basket, was struck upon the left cheek by a wooden awning support, which

*For full information, consult Woodhead, Wolf, Bebbers, or McFadyean.

†We return thanks to Dr. A. W. Sweeny, Washington, D. C., for assistance in the translation of the original paper; also Profs. M. Poncet, Lyons, France, and I. B. Murphy, Chicago, Ill., for several interesting and instructive clinical papers on actinomycosis.

caused a slight abrasion of the skin, followed by a slight swelling at the point of contact.

The conditions passed off in a few days, but two months later a gathering appeared at the seat of the contusion, and for two months afterward it caused him so much pain he could not sleep "without being greatly disturbed." He applied to a druggist to give him relief, and he gave him what proved to be mercurial ointment, by the use of which his sufferings were increased.

He then sought the advice of Dr. Guillemot, who, on making an examination with the fingers, found a fluctuating tumor about the size of a peach kernel, very irregular in outline, having a prolongation encroaching upon the naso-labial groove, and crossing above it on a line with the upright branch of the maxillary bone. "The tumor could be felt from the mucous surface from within the mouth, and could be grasped between the fingers and thumb in the buccal cavity."

The integuments of this "tumorous abscess" were thinned and disintegrated by "tuberculous liquefaction;" it was violet in color, and seemingly on the verge of mortification; yet there was no sign of any fistulous opening, although the patient informed him he had squeezed the gathering a few days previous, when a thin bloody secretion was forced out.

The patient's breath was very offensive,—all the crowns of his molar and incisor teeth were missing or in a bad state of decay. When asked if his teeth had given him any trouble before the accident, he replied, "No. No pain either in his teeth or jaws, except in the last few days from sore gums." (This condition was charged to the action of the mercurial ointment, as all signs of stomatitis disappeared in a few days after the use of saponaceous mouth-washes.)

Dr. Guillemot seemed so sure "that there was some connection between the bad condition of the patient's mouth and the tumor," that he insisted upon the patient having had some trouble with his teeth. The patient contended to the last that he had not been troubled with his teeth at any time, nor had he any pains in his face until two months after the accident, when the gathering in his cheek began to form.

When the tumor was punctured with a hollow needle nothing escaped, although the needle moved about easily.

When freely opened with a lancet a viscid fiuid escaped, mixed with blood and whitish-looking particles resembling small seed.

The contents did not wash out when injected with water, neither could they be squeezed out under pressure. "One might have imagined," says Dr. Guillemot, "that the cavity contained a sponge which held the fluids in its meshes."

The patient said on several occasions before seeking medical advice he had opened the gathering, when it became painful from tension. Dr. Guillemot remarks, "This could not be done save by a rupture or puncture of the integuments," and yet he found no signs of any scar of any previous opening.

Presuming that the "tumorous" abscess might have originated through some constitutional disturbance, the patient was given potassium iodid, with instructions to return and report later. He did so after a lapse of three months. The potassium iodid seemed to have produced no change in the tumor for the better, except to relieve the patient of pain; it was again freely opened and contents pressed out, which contained two whitish-looking bodies.

The patient was asked if he had noticed in any of the discharges any yellowish particles. He answered, "Yes; but not continuously, only at intervals in little groups." The suspicion then arose that it was a case of "actinomycose."

Some of the liquids from the tumor were sent to Dr. L. Doe for microscopic examination; his report was actinomycosis. At the next visit of the patient Dr. Guillemot curetted the tumor, after which a cure followed.

He calls special attention to the peculiar pathology of this "tumorous abscess," which, after having spontaneously abscessed several times, instead of remaining fistulous or evacuating its contents, seemed to increase and refill as the opening healed; also the remarkable fact "that the large incision

made with the lancet at the point which seemed to be on the verge of mortification, healed rapidly and left no sign of having been incised."

Dr. Guillemot concludes his report, viz: "What do we find in this case? A traumatism of the cheek caused by a large piece of wood; then two months after, at the point of the contusion, a cutaneous lesion,—the actinomyces having entered by the epidermis, and not by the labial or buccal mucous membranes.

"The two months of incubation should cause no surprise, for have we not seen many cases where the germs remained dormant for years? We are not yet sufficiently posted upon the laws governing the growth of germs in the human system."

Discussion.

Dr. A. W. SWEENY, Washington, felt a sense of obligation to Dr. Mills for calling attention to this condition. Though it is rare in this country, still about two hundred and fifty cases have been reported, not all in the jaws or in the face, but in various parts of the body. Dr. Guillemot, who treated the case described in the paper, was a physician, but not ignorant of the diseases of the teeth, as many physicians are. He thought for a long time that it was an alveolar abscess, and it required reference to a microscopist to decide what it was. In Dr. Smith's paper it was proven that there are two distinct kinds of alveolar abscesses, and this may be a third variety. It seems that the disease that Dr. Smith's paper treated of is caused by the invasion of a germ, and causes a different though somewhat similar diseased condition.

Dr. MILLS said that the disease had rarely been described in this country, but in France, Germany, and Denmark there have been thousands of cases. The germs of this disease could enter and infect any part of the alimentary canal, or even enter the lungs by inspiration, as well as be introduced through the external integuments.

It has been thought that the white blood-corpuscles are responsible for the placing of the germs in distant parts of the body. They are supposedly unable to digest or destroy the germs, and it is thought they disgorge them after conveying them in their way through the blood-vessels, where they are found and where they cause the disease.

Dr. D. N. RUST, Alexandria, thought perhaps the reason the disease was not more frequently reported in this country was not because it did not exist, but because it was not recognized.

The subject was passed, and Dr. W. H. EWALD, Wytheville, Va., described a case which had been in his practice for discussion and advice.

The case was one of necrosis, involving the upper left central and lateral incisors, also the cuspid. The patient was a young man. Three or four years ago he had a bubo, and had been treated with mercury at that time. His family are tuberculous. The case was brought to Dr. Ewald about the first of April. Upon examination the central and lateral were found to be very loose from excessive loss of bone and gum-tissue, and there was considerable pus forming. He was puzzled to account for the condition, and as yet had confined his treatment to palliative measures. He asked the convention for advice.

Dr. Donnally, Washington, thought the disease of the mouth, as concentrated about the teeth mentioned, was probably entirely independent of any systemic disease. He would treat it locally with hydrogen peroxid and clean out the dead bone; then use sulfuric acid, about twenty or thirty per cent., keeping it in contact for several minutes. Then have the patient apply a weaker solution of the acid with a syringe daily, and he would see the case every week. He had treated a somewhat similar case. A lady had had some crowns put on the teeth, and the centrals were so loose they could easily have been removed by the fingers. There were several openings, and it was difficult to get the acid in contact with every part because of the excess of drainage.

Dr. Mills said that he would absolutely refuse such a case as described by Dr. Ewald until the constitutional disease had been treated.

Dr. Thos. Fillebrown did not believe the systemic condition was responsible for the condition of the teeth. He did not think that a bubo three or four years ago would entail results like this so long afterward. He never knew of a case where syphilis attacked the alveolus; when it attacked the mouth it was usually the palate that was affected.

The case looked to him like an alveolar abscess, which first occurred on the lateral incisor from the dead pulp, which was probably caused by violence of some sort. If this tooth had been opened shortly after the pulp had been destroyed this trouble would not have occurred. He did not think that the condition can be cured, as the tooth is dead and entirely loose. He would take the lateral out and try to save the central, and should expect to cure the trouble.

Dr. L. M. Cowardin, Richmond, took issue with Dr. Fillebrown on his belief that the described condition was not a manifestation of syphilis because it was not where such manifestations were usually found. From the previous syphilitic history of the patient, he should think that the trouble was of syphilitic origin. He had had cases in his practice that proved to him that syphilitic ulceration may be established anywhere. He described a case which was similar in most of its features to that described by Dr. Ewald. It was in the identical part of the mouth; the gum-tissues and the osseous tissues were both melted down. Upon questioning the patient it was learned that some eleven years previous he had had some trouble, but he denied that it was syphilis. He sent the patient back to his physician, who put him on potassium iodid, and in ten days the trouble had decreased. Dr. Cowardin then removed the dead bone and applied ordinary local remedies, and the condition was cured. His issue with Dr. Fillebrown was not as to whether the case Dr. Ewald described was or was not syphilis, but that syphilis does attack the alveolus. In Dr. Ewald's case he doubted whether it was syphilitic.

Dr. Brown thought the teeth were the cause of the local irritation, which resulted in abscess and necrosis of the bone. Such cases occur over and over again where there is no history of syphilis.

Dr. H. W. Campbell, Suffolk, Va., said there seemed to be a considerable difference of opinion about this case. In his judgment the trouble came from something external, probably a blow. The lateral incisor is dead and has never been opened, and it is a question now whether it can be saved. He would not extract either of the teeth, but would, if possible, open the lateral, take out all disintegrated substance, and syringe out the cavity with McKesson & Robbins's pyrozone. If there seemed to be no improvement from this treatment he would then extract the lateral, and if necessary the central, and remove the necrosed bone. He had had similar cases, and did not believe it would be found necessary to extract the teeth.

Dr. Noble, chairman of the Committee on Orthodontia and Dental Appliances, read the following paper:

Correction of Irregular Teeth.

Few things in dentistry have given so little satisfaction or profit to the general practitioner as the correction of irregular teeth.

The reason for this is made clear if we study and understand the conditions under which it is generally undertaken.

To be successful requires experience, good judgment, a clear understanding of the laws of mechanics, absolute control of the patients, and confidence in the operator; a careful study of the articulation, age, and temperament, and a definite idea of what is to be accomplished.

All of these qualifications are required as pre-requisites to success, and the lack of either invites failure and injury to both patient and operator.

Let us examine these requirements in the order named.

First. Considerable experience is required in the making and adjusting of fixtures, especially with the elaborate and complicated appliances so often recommended by those who write and speak upon the subject, and which if used will bring distrust and discouragement to both patient and operator before the work begins to show an advancement or improvement. Many a case has been given up for lack of experience in the time requisite to accomplish the movement of teeth or the failure to locate and remove the cause of delay, which an expert in regulating would readily detect and correct.

Second. Good judgment is necessary to examine, see, and gather all the facts and conditions, and give to each its proper relation and bearing, so as to form a reasonable and proper diagnosis of the case and the probable results. A lack of judgment in properly gathering and collating all the facts and conditions, and of estimating the probable results, has caused many a disastrous and undesirable condition of teeth that have been regulated.

Third. Without a clear idea of the laws of mechanics and their application to the fixtures and teeth to which they are to be attached, failure is almost inevitable and a natural result.

Fourth. Absolute control of the patients must be assured, so that all directions will be carefully observed and obeyed; which cannot be had without confidence in the operator, both by the patients and the parents and guardians who have charge or control; a clear understanding on this point is necessary before the work is undertaken, and a promise exacted that every direction shall be carried out, subject to no whim or opinion of either patient or parent; if any doubt arises the operator must be consulted.

Fifth. A careful study of each and every case should be made from models of the mouth taken for the purpose, and time and attention given to it without distraction; studying the articulation both above and below as to present and future relation.

Age and temperament must be observed and considered, as well as the general health and habits, to form a reasonable opinion of what can be accomplished in any given case.

With these propositions accepted as proper and necessary requirements, is it any wonder that there are so many disappointments and failures and so little disposition among dentists to give the time and attention necessary for its accomplishment, emphasized most likely by a failure in several cases when just entering the profession, from the lack of one or more of the above-stated requirements to success?

Another reason for the general apathy or indisposition of the general practitioner to undertake the correction of irregular teeth, has been the publication and elaborate description of complicated machinery and fixtures used by many of those supposed to be experts in this special line of practice.

Many of these appliances are most complicated and only adapted to the one particular case, and satisfactory results are obtained often by the wearer of them going through suffering and pain only equaled by the tortures of the Spanish Inquisition. I know of two young ladies whose health has been broken down and injured by the wearing of these complicated horrors. The time is past for the use of any such costly and painful fixtures.

Dr. Jackson, of New York City, has given the profession a simple and efficient system of correcting all forms of irregularity; it consists of a small piece of wire (German silver generally used) bent in a U shape to lay on the gums on the inside of the teeth, and soft-soldered to a crib and wire clasp, made to fit such teeth as may be selected for attachments; and to this bar solder wire to serve as springs to push and move teeth. A full description of the Jackson system is published in the "Transactions of the World's Columbian Dental Congress," and I would advise every one who proposes to do any regulating to read and study it carefully.

I believe the time is not far distant when most of the treatment of irregular teeth will be turned over to the expert specialist in that specialty, for it is, or ought to be, considered as a specialty, and more time, care, and attention given to it than is or can be given to it by the busy practitioner; for time, care, study, and attention ought to be given, and must be if the proper results are to be obtained and the comfort and welfare of the patient is to be considered.

Discussion.

Dr. E. P. BEADLES, Danville, Va., asked Dr. Noble's opinion of the Angle system.

Dr. NOBLE said it was not without merit, but that it was more complicated and more liable to move the wrong teeth. Dr. Jackson's system has not this danger. Besides this, the Angle and other systems are applicable only to special cases, while the Jackson system will cover every possible case.

Dr. H. W. CAMPBELL, Suffolk, Va., spoke of cases where the central is pushed out of the arch and projects farther than the rest of the teeth. When the arch is expanded to get room to bring in the central incisor, one will be one-fourth of an inch shorter than the other. Dr. Angle in such a case recommends a bar placed across the teeth and a band around the tooth that is too short, and that the tooth be pulled down to the same length as the others by means of a rubber band extending from the bar to a knob on the band. He had failed to get a tooth into position by this means.

Dr. T. S. WATERS, Baltimore, described a method he had used where the edge of an incisor was broken off. He made a cusp to fit the teeth on each side and a cap for the broken tooth with a lug on it, and with a little spring on the lug and fastened to the other teeth you can bring it down to where you want it. He placed a little fixture to hold it in place for a few weeks where it remained.

He commended Jackson's system of correcting irregularities for its convenience to the patient and to the dentist, and for its economy in expense. Dr. Farrar by his system is able to correct any irregularity that can be corrected by any system, but the appliances are so complex that the average man cannot count upon success with it.

The subject was passed.

(To be continued.)

PENNSYLVANIA STATE DENTAL SOCIETY.—ANNUAL MEETING AT GLEN SUMMIT, PA.

FIRST DAY—*Evening Session.*

THE evening was devoted to a lantern exhibit by Drs. E. C. Kirk and M. H. Cryer. Dr. Kirk's exhibit consisted of the series of slides used by Dr. J. Leon Williams, London, England, in illustration of his paper read before the Odontological Society of New York, in January, 1897, entitled "A Contribution to the Study of Pathology of Enamel."

Dr. Cryer's exhibit was a series of original lantern-slide photographs, illustrating a study in special dental anatomy. The first portion of the exhibit dealt with the so-called normal osseous structures of the jaws, head, and face; the latter portion with their pathological variations.

The main point developed by Dr. Cryer was his attitude with respect to the generally accepted view that "anatomy is an exact science." This the lecturer held to be incorrect, for the reason that it involved the assumption of a precise and exact standard of anatomical conditions, a normal anatomical structure in an organism which does not exist. The variations in individuals, determined by age, environment, in fact the whole series of factors involved in nutrition, acted as a variant in relation to anatomical structure, with the result that no two individuals were or ever could be precisely alike. From that point of view anatomy never could be correctly considered an exact science.

The correlation of anatomical structures was emphasized by the fact brought out by the exhibit in question,—viz, that where the dental arches, palatal vault, etc., were found to be symmetrical, a corresponding normal bilateral symmetry of the other osseous structures of the head was found in invariable association. This fact became of value as a diagnostic indication in connection with the study and therapeusis of the several sinuses and related structures of the head.

A further important point demonstrated was the possibility of cerebral disease following as the result of stenosis and occlusion of the infundibulum.

An anomalous relation of the roots of the upper molars was shown where their apices penetrated the nasal floor instead of the antral floor, as is not infrequently the case.

The forenoon of the second day, July 7, was devoted to clinical demonstrations by a number of operators. The entire afternoon and most of the evening sessions were taken up with the annual elections and with an investigation of charges of irregularity in connection with the previous annual election. A paper was read by Dr. C. R. Scholl, Reading, Pa., entitled "System in Office Practice," which was a short *résumé* of some of the more important minor elements that make for success in dental practice. The essayist presented specimens of his engagement cards, and explained his method of recording all work and the charges therefor done for his patients.

Third Day—*Morning Session, July 8.*

After the usual routine business a paper by Dr. Robert Huey, Philadelphia, was read by the author, as follows:

The Progress of Dental Education in America.

The subject covers a field much too large for the limits of such a paper as this. Almost every dentist of the last fifty years, who had a true feeling of professional responsibility, has had something to say about dental education, and the literature fills hundreds of pages in dental journals and the proceedings of societies. It is therefore impossible to follow in detail the labors of the many honored men who have toiled and struggled and sacrificed much to rescue dentistry from the mire of charlatanism and quackery and elevate it to the standard of a liberal profession. The writer can

only attempt to briefly outline the several steps in the development of dental education, and endeavor to point out the factors that were instrumental in accomplishing the results we are now enjoying.

The beginning of dentistry in America dates from the arrival of Mr. John, or Robert, Woofendale, an English dentist, in 1766, who practiced in New York and in Philadelphia, filling, scaling, and extracting teeth and inserting artificial substitutes. He remained for two years only, returning to England in 1768, and for some years thereafter no record can be found of any regular practicing dentist in this country until Joseph Lemaire, who came here with the French army, offered his services as a dentist to the general public, and undertook to instruct several persons in the mysteries of the art. This may be considered the origin of dental instruction in America.

Later we read of a dentist named Baker, of Dr. James Gardette, the Greenwoods, father and son; Josiah Flagg, Horace H. Hayden, Edward Hudson, John Randall, Leonard Koecker, and others.

These men were all, for their time, capable, painstaking, and successful. It is surprising how much useful service they were able to render when we consider the difficulty of obtaining any accurate knowledge. Each man seems to have worked out the problem for himself, for practitioners were extremely chary of imparting any knowledge of their craft to a rival.

Dr. Horace H. Hayden was the first to recognize the necessity of combining the knowledge collected by individuals, and as early as 1817 endeavored unsuccessfully to form an association of American dentists. Nothing daunted, he continued his efforts for many years, and at length, in 1838, with the assistance of the better men engaged in practice, started a movement which resulted in the formation of the American Society of Dental Surgeons, at New York City, in 1840. "Up to that time there had been very little intercourse among the small number of men who had struggled under great difficulties into such a knowledge of dentistry as enabled them to render good service in their calling. The objects of this movement were to furnish to honorable and competent dentists a medium of personal intercourse for the exchange of views upon professional subjects, to draw a clear line of distinction between worthy men and impostors, and to establish some standard by means of which the public might be able to recognize this distinction."* During the time occupied in completing this organization the first dental journal was started (1839), and named the *American Journal of Dental Science*. It was conducted under the editorial charge of Eleazar Parmly, New York, and Chapin A. Harris, Baltimore. In 1841 it came into the possession of the American Society of Dental Surgeons, and the title was changed to that of *The American Journal and Library of Dental Science*, and placed in charge of Dr. C. A. Harris and Dr. Solyman Brown, who were assisted by twenty collaborators, whose duty it was to furnish matter for the work and aid its circulation.

*Dr. Robert Arthur, Cosmos, vol. xvii, p. 230.

At this time there were about twelve hundred practitioners of dentistry in America, more than half of whom were ignorant, incapable men, whose knowledge was composed of a few secrets they had purchased from some other charlatan. They knew little and cared less about the duties devolving upon them, and yet they were always ready to receive pupils and instruct them in the secrets and mysteries of the art, provided they were well paid for it. The fees exacted in these cases varied from five dollars to one thousand, and the time occupied was very brief. Three or four weeks they considered ample time in which to attain all the knowledge necessary to the pursuit of a successful calling.

There were others who had advanced beyond this standard and had attained by careful study and work a general knowledge of the principles and practice of dentistry, and especially of mechanical dentistry, and who were compelled, in order to compete with those about them, to add by every means in their power to the knowledge and experience daily achieved in their practice. These men did, for their time, fairly good work, and were no doubt useful to the communities where they labored, but they do not seem to have caught the professional spirit. All the information they gathered and all the discoveries they made were carefully concealed from their colleagues, and no inquisitive visitor was ever admitted into the inner sanctum until everything that might possibly afford a clue to methods of work had been carefully hidden. Little advance could be made where such standards prevailed.

But fortunately there was a small number of men who were imbued with a true professional zeal, men who were impressed with the belief that dental surgery held a position far beneath that to which it was entitled, and that as all these evils could and should be remedied, it was their duty to devote a portion of their time and energies to the work. Consequently, in addition to increased study and experimentation and sifting of truth from error, they endeavored to make the profession acquainted with the results of their labors, and dental literature of an improved character began to make its appearance.

It now became evident that some other means than were previously adopted should be devised for the proper education of those desirous of pursuing the calling, and to this end the Baltimore College of Dental Surgery was instituted in 1840, with the following faculty: Horace H. Hayden, M.D., president, principles of dental science; Chapin A. Harris, M.D., dean, theory and practice of dental surgery, theory and practice of dental mechanism; Thomas E. Bond, M.D., dental pathology and therapeutics; H. Willis Baxley, M.D., anatomy and physiology. It is interesting to note that every member of this faculty was a graduate of medicine.

There were but two regular graduates in the first class, 1841, Robert Arthur and R. Covington Mackall, of Maryland. Eighteen honorary degrees were conferred in that year in recognition of the standing and attainments of those already engaged in the practice of dentistry.

In 1849 the chair of chemistry was instituted and in 1856 that of microscopical and comparative anatomy. This latter was a significant onward movement. It should be remarked that for several years the study of comparative dental anatomy was followed earnestly by the general anatomist, so that we must ascribe this advance as much to the influence of the general scientist as to the dental college. The establishment of college after college in different parts of the country came in rapid succession, and has continued up to the present time, until now some fifty institutions are competing for the honors and the emoluments to be obtained in the education of professional aspirants.

From a few meagerly furnished rooms, and what would be regarded now as extremely crude plants, have come, step by step, the setting aside of large and special buildings, with elaborately appointed laboratories and clinic rooms. The dentist is an ingrate indeed who fails to give the attention to the character and accomplishments of those justly honored men who have wrought this great change and forged out of the chaos which confronted them the magnificent thing we call modern dentistry.

My first experience in a dental college began in 1866, where I took up, under the tutelage of the late Dr. J. D. White, the preparatory studies which had been interrupted for four years by the great Civil War, that dreadful conflict, unparalleled in history, which cost years of misery, oceans of blood, and untold suffering to prove that "government of the people, by the people, for the people shall not perish from the earth."

The Pennsylvania College of Dental Surgery was then situated at the southeast corner of Tenth and Arch streets, in Philadelphia, in a building originally intended for a store and dwelling. The first floor was used as a store, the second, having the dividing partitions removed, was used as the operating and clinic rooms, and was furnished with Archer chairs and stationary spittoons, and a few benches for the accommodation of patients in waiting; the third and fourth floors as mechanical laboratory, museum, and two lecture rooms, each with a seating capacity of eighty to one hundred.

The faculty consisted of five professors, who taught respectively chemistry, mechanical dentistry and metallurgy, dental surgery and therapeutics, anatomy and physiology, dental physiology and operative dentistry. There were two demonstrators, one of operative dentistry, the other of mechanical, and two hours daily were devoted to clinical instruction in each branch for a period of sixteen weeks.

I had much to learn and more to unlearn, so that the brief time was fully occupied. A fair addition was made to my small stock of information, necessarily superficial from the limited time demanded and devoted to the purpose, and in due course I passed an examination that was satisfactory to the faculty, and with some twenty-five others was launched out upon a confiding public as a full-fledged practitioner of dentistry.

This college was undoubtedly the peer of any other; the faculty

was able and conscientious, thorough and painstaking; the facilities for imparting instruction and performing clinical work were quite as good as could be found elsewhere; the grade of men graduated was fully up to the then standard, yet, in looking back from the standpoint of to-day, how crude and insufficient it all seems to have been.

That the faculty was satisfied with the equipment of the students, either in theory or practice, may well be doubted, but they were so hampered by limitations and conventions that they could not well lengthen the course of study or insist upon a higher standard. The times were not ripe, competition was too brisk, and the dental student was more anxious for the degree that entitled him to practice than he was to obtain a liberal education.

Dr. George T. Barker, writing on this subject, said, "The fact must be patent to all that one of the sources of the success of the dental profession in the past has been the teachings of the dental colleges, and in the future the greatest good will be accomplished if the facilities of such colleges are enlarged and perfected; but there must be a modification of existing institutions. * * * * In conversation with graduates and students for the past fifteen years, I have found numbers who are aware of and recognize the shortcomings of dental education and dental colleges, and the conviction has been generally expressed that the curriculum of study should be made more practical, more comprehensive, and more in accordance with modern ideas and improvements." These are the words of a man who was always intensely in earnest, but there is conclusive proof that other contemporary dental educators entertained and expressed similar opinions.

It is fitting that we turn from this description of a college of thirty years since to look at a representative college of the present, omitting naming the institution to avoid the possible drawing of invidious comparisons. First, a large building, erected especially for the purpose of teaching dentistry; large, well-lighted rooms set aside for dental laboratories; these fitted up with all of the appliances suitable for performing any operation in the field of prosthetic dentistry, special rooms being set aside for the special features of mechanical dentistry, among which is a metallurgic laboratory.

Next, large and perfectly lighted operating-rooms, furnished with high-grade chairs, electric current, movable brackets, etc. A special room set aside for extraction, fitted up with all the apparatus required in the administration of general anesthetics. There are perfectly equipped chemical, pathological, and bacteriological laboratories; a special dissecting-room, an amphitheater, seating comfortably over five hundred students, and provided with a projecting lantern of great power and clear definition for illustrating lectures.

Next, a museum into which are gathered all the material procurable, relating to every phase of dentistry.

A survey of the teaching corps shows the chairs of anatomy, physiology, chemistry, materia medica, and surgery to be filled as

they would be in any medical college of the land. The dental corps comprises professorships in dental anatomy and dental pathology, in operative and orthopedic dentistry, in prosthetic dentistry and metallurgy, and the special surgery of the jaws, mouth, and associate parts is taught as an essential study.

To the professorial chairs there are assistants who instruct both didactically and clinically. In addition, what appears to be an extensive corps of demonstrators takes charge of the laboratories, one or more demonstrators to each chair. All the work of the student is thoroughly systematized and recorded, so that at the end of each day the standing of any man in practical work can be learned in a few minutes. The kind and character of his operations and his growing ability to do creditable work are carefully noted, his failures ascertained and recorded, and special instruction is given wherever needed.

The period of instruction is three courses of six to nine months each. The work of the student is pursued systematically, it being necessary that the laboratory work and studies of each year be fully completed before admission to a succeeding year's work is granted. At the end of the third session final examinations are exacted in the several branches, when the applicant for the dental degree must exhibit a seventy per cent. familiarity with each subject in which he has received instruction.

Having thus endeavored to show by a comparison of the scope and methods of past and present professional schools the progress achieved in their efficiency, let us consider the factors entering into that progress. Now that we have emerged from the dark ages of empiricism and charlatanry, when every member of a liberal profession deems it his sacred duty freely to contribute to his brethren any fresh knowledge he may acquire in theory or practice in the experimental laboratory or at the operating-chair, it is impossible to disregard the influence of the profession at large on the work of the college.

In such an eminently practical profession as dentistry we are not surprised to find that many, if not most, of the advances in practice are the results of the work of men entirely engaged in practice and not belonging to any college faculty. For instance, Dr. Barnum gave us the rubber-dam, which entirely revolutionized the methods of isolating given teeth during clinical work, and made antiseptic treatment of pulpless teeth no longer a probability, but an assured success. Dr. Bonwill's invention of the electrical and mechanical mallets made most radical changes in the impacting of gold in filling teeth. To Dr. Morrison we owe the dental engine, probably the most efficient labor-saving instrument we possess, and to him we are indebted for the first radical advance in adjustable operating-chairs. Dr. Allen and succeeding inventors gave us the clamps, without which the rubber-dam would in many cases be utterly useless. Dr. Jarvis and Dr. Perry gave us separators, Dr. Wm. Woodward a practical cervical clamp, Drs. Jack, Woodward, and others matrices; Dr. Marshall Webb taught us the nearest approach to perfection in restoring carious teeth to

their normal shape. Dr. Younger taught us implantation. And to many others, who were not identified with colleges, we are indebted for improved methods, materials, and instruments.

And in theory we have the labors of Black, Thompson, Wedl, Miller, Hugenschmidt, Williams, and others, who, when they gave their first discoveries to the profession, were not members of any college faculty.

It is not only in such material ways that the influence of this profession at large has made itself felt. As alumni of their respective colleges, practitioners and writers have ever been ready to show their interest in the success and the good name of *alma mater* by advice and suggestion, and, when occasion demanded, by criticism. Such criticism, when made in a kindly spirit and dictated by loyal devotion to the welfare of the public and to the best interests of the profession, has usually been accepted in the same spirit, and has been influential in checking the tendency on the part of college administrators to be swayed by considerations of policy and commercial success, and has incited to further advance in equipment and instruction.

There is another class of critics who by word and act have been inimical to dental colleges. They have sought to sway by compulsion rather than by moral suasion. In the language of parliament, they represent the opposition. In most cases their influence has been hurtful, and has retarded advance by engendering opposition; and good ammunition has been wasted that should have been profitably employed in fighting the common enemy,—ignorance. But these have not been without some measure of usefulness. They have introduced the element of compulsion, which has been a dominating force; and this brings us to the subject of dental legislation, which in large part has been the product of the elements included under the head of college critics, both friendly and unfriendly.

In much of legislation pertaining to professional matters there always has been a tinge of the selfish spirit, savoring more of a desire to lessen competition than of the motive which should underlie all such action,—a desire for the good of the public. It is undeniable, however, that sound legislation is the element which did and will direct the advances and maintain the dignity of our profession. There is one evil, however, which attends the craze for legislation,—viz, over-legislation. If we seek to establish by revolutionary violence changes entirely radical in nature, we must expect to encounter the difficulties which beset all who interfere with the normal progress of an evolutionary process. It is evolution, not revolution, which produces all the stable advances of this world. It must be accepted that criticism advanced in dental journals, in dental conventions, and materialized into acts of legislature, has compelled colleges to advance their standard almost year by year. It must be admitted, though, that it is only fair and well-directed criticism that has had this effect. Hypercritical criticism, advanced in many cases by men who set up a standard to which they themselves could not reach, has deservedly failed,

though it may have appeared to succeed for a period. It is perhaps fortunate for the older practitioners that they are not required to pass the examinations exacted from the newly graduated at the present time. The friendly critic, of both direct and oblique criticism in the several journals, has operated as genial sunshine upon dental education, in some colleges finding but a bed of clay, in others germinating seeds.

The most potent of all the extrinsic forces is the potential force of extra collegiate study, one potential element of advance which becomes active under the hands of the advanced college teacher; for example, Miller's studies are utilized by the advanced teacher as soon as they appear. I am told that the studies of Dr. Black and of Dr. Williams are already analyzed, simplified, and applied in dental colleges. I am speaking, of course, of up-to-date colleges. There were, are, and will be institutions in which professors have a steady rate of progress a decade behind their times.

Contrariwise, it is in colleges that many fallacies and false doctrines are punctured and receive their death-blow. This carries us fairly into the field of the intrinsic causes of advance in dental teaching, forces acting within the college itself. The extent to which improvements are voluntarily adopted by dental teachers is governed largely by the individuality of the teacher and his intellectual caliber. Theoretically, a college professor stands as interpreter between his subject and pupils, adopting, selecting, and arranging material; next analyzing it and presenting it in a form fit for the comprehension of a student. It is more important that he should possess the ability to do this well than that he should be an original investigator. A judicial mind, a careful discrimination, and the power of clear exposition have always been regarded in any field of learning as the factors which count most. An intellectually ill-balanced, a narrowly-cultivated pedant may *occupy* a chair, but he can never *fill* it. A man is never great simply because he occupies a college chair, but if he is great enough he usually comes to occupy one. I believe a general vote of opinion would say that *most* of our college chairs are well filled, and in others that the subjects are inadequately presented.

This paper was compiled and prepared at the suggestion of the chairman of your Executive Committee, in the endeavor to fairly answer the question, "Have the dental colleges kept pace with the times?" My own belief is that they have. While they have not always been leaders, they have gone forward, shoulder to shoulder, with the profession, and by carefully weighing the mass of material presented from without, through the channels I have indicated, by discarding what is false in doctrine and valueless in practice, and by placing the result of such judicious selection before the aspiring student in the form adapted to his understanding and according to the best methods of teaching, but, above all, by supplementing didactic instruction with thorough practical demonstration in laboratory and clinic, the dental college of to-day may fairly be said to have kept abreast of the times. To claim for all our colleges such a high standard of excellence as this implies would perhaps

be too much, but many such there are, and through the agency of their example and the influence of their graduates, who go forth every year in increasing numbers through the length and breadth of the land, we may be permitted to hope that the others will not be long in following their lead.

Discussion.

Dr. GUILFORD. Dr. Huey has very well said that the progress of dental education has been very great in the last thirty or thirty-five years. I would like to say it has been even still greater in the last eight or ten years. Progress in this last short time has been little less than marvelous. The men who went out from the colleges twenty, or fifteen, or even ten years ago, have very little conception of the progress that has been made since they left.

It is a matter of general and gradual progress. Dr. Huey spoke of enlarged buildings, and modern chairs, and all that. Those things are matters incidental to the growth of the number of students and everything of that kind which regulates itself. It is like the growth of a town or of a business. But there are two points I would like to emphasize and bring to the notice of many here who have not been closely connected with colleges for many years and who do not know the way in which the student is taken and gradually taught and trained.

When Dr. Huey went to college it was just a year or two after I went there. We were supposed to have had a certain amount of training in our preceptor's laboratory, and we began to work on living subjects at once. That was done because they didn't know a better method of instruction. All that is altered to-day. When the student to-day goes to the dental college he is supposed to know nothing at all about dentistry. He begins in an elementary way, and is trained in a knowledge of fundamentals by practice at the bench with instruments in doing operations upon extracted teeth; he is made familiar with their morphology, their anatomical and histological characteristics, and is taught the technic of all operations upon them which are possible under the circumstances. The course of training is so graded that the student is not permitted to operate upon the living subject until he has acquired sufficient knowledge and skill to do so intelligently and with a degree of success. This part of his training may take up his entire time during the first year.

Another point is the supervision over students; the professors in the colleges have kept pace with the times. They have extended their courses of lectures, and have learned how to impart truth better; how to appeal to the student through his eyes, by charts, blackboards, and by enlarged models; those things, however, are the result of a natural growth. It seems to me one very essential point is that the student is watched and his progress is noted. Dr. Huey will probably remember when we were students at college. I don't think we had any examinations at all the first year, but only at the second. We were examined at the end of the term. Now we have intermediate examinations. In some cases, especially

where the classes were large, the students were sometimes disposed to neglect their opportunities. Such a thing to-day is impossible. The student is watched over and a perfect record is kept of everything he does. At certain intervals the authorities look over the books. If they find that work has not been done, or that the attendance has run low, that student is called up and told, "Here, you have not done the required amount of work, and this is the middle of the term. If you don't have it done by the end of the term you cannot pass; you are warned." And so with regard to the attendance.

These things, I think, are important in the way of the progress in dental education.

Dr. TRUMAN. Dental education, as the essayist has explained it, had its origin in very simple and crude things, and all of us who have come up from the beginning of the last half century to the present time in this work know very well that the progress which has been made has been accomplished not outside, as he has stated, but inside. That it has been the endeavor of all the men who have been connected with dental education to advance it, step by step, as they could see their way clear to do it. Members of the dental profession throughout the country can never appreciate the labor and anxiety and sacrifices that the men who have been the educators in this country have gone through to bring the college and education up to what it is at the present time, and I think it is due to these men that something should be said; and I am glad Dr. Huey has said what he has upon this question. It is the easiest thing in the world for a man outside of any calling to undertake to criticise men who are doing their best. And oftentimes that hypercriticism has no force, simply because the men who make use of it are not as familiar as they should be with the work in all its details.

I feel that there is one agent that Dr. Huey has not done justice to; I don't think he mentioned it. Some years ago when Dr. Winder, of the Baltimore College of Dental Surgery, called upon me with the suggestion that we attempt to organize the colleges of the country,—and he was earnest in the belief that if that could be done the level of dental education would immediately rise,—I felt the same as he did, but in the then condition of dental education it seemed to me impossible that we could bring the colleges together. I have always believed in making an effort, and in connection with Dr. Peirce, of the Pennsylvania College of Dental Surgery, and the late and ever lamented Prof. Garretson, of the Philadelphia, we issued a call for that organization of dental colleges in this country, and had them meet in New York City. To my surprise all the principal colleges in this country at that time were represented at that meeting; all were strangers to one another. The first act of that body after organization,—and, by the way, they made the simplest organization ever completed by any body, simply a few resolutions,—the first act was to do away with the five-year rule, as it was understood at that time. A student then could go into a college, and if he had had five years' practice,—I should say, in

a dental or private office,—he was accepted for one year and graduated. That was the first thing that that institution or society annulled, and no college could be accepted in it that had that rule in force. That was the beginning.

From that date to this the Association of Dental Faculties of the United States has done more, in my opinion, to carry forward dental education than all the other influences combined. It has gone on steadily, step by step, increasing the curriculum, increasing the time, and consequently bringing up the work.

I think some allusion should be made to this, and I hope that Dr. Huey will incorporate that into the paper before it goes to press, because it would certainly be defective without that.

Another point: He seems to think that all, or at least a large proportion of the work, has been done outside of the colleges. I think he is incorrect there. But let that go. Some of the names he mentioned certainly have been either in medical or in dental schools. I noticed the name of Wedl. Wedl is a professor in a German medical school, and is not a dentist at all. The greatest work, perhaps, of the latter part of the present century is by Miller, who is a professor in a dental and medical college in Berlin.

Dr. LITCH. I think Dr. Huey's qualification was that they were not, at the time of their greatest works, connected with the schools.

Dr. TRUMAN. There is another point: the action of law upon the dental schools. Law is very good, provided it is kept within bounds, but in my humble opinion the American people are fast going into that condition that every one who has resided in Europe for any length of time has noticed, that the people there are bound down by law. As it is said in Germany, the police officer begins with the infant in the cradle and follows him to the grave. Now, if we are to go on as we have for the past few years everything that we do will have a law behind it. The dental colleges to-day are suffering from this continual manipulation with their work. Only recently the National Board of Examiners undertook to or did issue a circular, demanding that dental colleges should have a certain curriculum. Why, the thing is absurd! Now, let us reason intelligently on this subject of law. I think the present law that has just been adopted by Pennsylvania is probably one of the best that we have in the United States.

In nearly two-thirds of the states the Board of Dental Examiners are nominated by the governors of the various states, who are politicians. Now, what can we expect in the colleges? Can we ever expect that justice will be done to our students who go out into the world to be examined by a class of men with no responsibility to any dental society?

I hope that when we get down to Old Point Comfort the new organization which is expected to take place will do something to regulate these conditions between the law and dental teaching. Men who, as I said at the beginning of these remarks, have sacrificed almost everything in life for the purpose of educating men, cannot take kindly to this continual criticism of men whom they cannot appreciate, men that they know are not qualified to sit

upon their work. Most of these boards of examiners know nothing about their qualifications; men perhaps who have never seen the inside of a dental college undertake to sit and examine our students. It is intolerable! I have fought this thing for years, and I am glad to see that it is coming to a culmination, when we shall have justice done to the colleges of this country.

Dr. BRUBAKER. From time to time, in these various organizations, I have heard a great deal of criticism on the work done at the dental colleges, and a great many suggestions as to the necessity of giving the dental students a wider and more liberal and more scientific education. These criticisms, I presume, are based upon the fact that the students should have a wider knowledge of anatomy, physiology, chemistry, materia medica, pathology, and bacteriology. There are criticisms that the colleges are not anxious to teach the students these branches of knowledge as they should be, and that the outside profession, somehow or other, appreciate the necessity for this knowledge more than the teachers in the schools.

Now, anyone who has been teaching either anatomy or physiology, or any of these branches, will agree with me that the main obstacle to a more general education in dental colleges is the apathy of the students themselves. The student comes to the college with the presumption that the main thing to know is how to do the purely practical work of the profession. If the student could be made to believe, if he could be taught in the very beginning that it is just as essential, and more so, to have this general groundwork, the general scientific knowledge, than to have the practical knowledge, it would be much better for him at the end of three years.

The dental colleges cannot possibly rise much higher than the general profession. If the dentists throughout the country should insist that each student who went to the college should go with the understanding that he is to devote the time largely through the first year to a thorough knowledge of these fundamental branches, the general profession would, in a short time, be immensely improved. It is all very well for the dental profession throughout the country to say that certain things should be done, but when the practitioner sends his student to the college he does not send him with that idea in his mind at all. The student goes into the office of the practitioner and is at once put to the study of certain practical things. No attention is paid to his general education, or only in very few instances. Does the practitioner tell his student, or his own son, "You must begin your work by studying the general science and not the purely practical work?" I know in my own experience students come to the college, year in and year out, with a look of amusement on their faces when they are told they must study anatomy, that they must dissect, or attend lectures on pathology, and that they must do a certain amount of practical work. They cannot see and don't want to see the necessity. If they are asked to take a course in histology, to learn the use of the microscope, they think it is perfect nonsense. When the subject of

general pathology was suggested a few years ago almost the entire class got up and objected, and introducing bacteriology the same thing arises.

The colleges are anxious to keep their students, of course. The teachers in the schools read the dental journals; they know what advances are being made, and what are the necessities of the future, but they cannot drive the students to grasp it. If the dental practitioners throughout the country will say to each one of their students, "These are the things you are expected to do, and must do," the dental colleges will progress a great deal more than at the present time, great as their progress really is.

Dr. STELLWAGEN. I can go back for about thirty-seven or thirty-eight years in experience with dental colleges, thirty-two years of which I have been most of the time actively connected as a teacher in dental schools. I don't think it is necessary for me to defend dental professors, nor do I deem it necessary for me to speak of their earnestness and their sacrifice further than to say this, that if my son should come to me to-day for advice I should be inclined to advise him to keep out of the colleges if money was what he desired; if pleasure and happiness, the pleasure and happiness that comes from living, earnest, sincere friendships that are formed with the students during the dental school term, was a matter for consideration, then I should say, above all other things, take a professorship or demonstratorship in a dental school. I don't think there is a professor in a dental school, or very few, at least, who does not give two dollars of his time to every dollar he gets from the dental college. I believe that has been the experience of the most of us, and, therefore, the innuendoes and attacks that have been made in slighting ways I think it unnecessary for us to pay much attention to. It puts me in mind of the fly which lit on the pole of the carriage and directed the horses how they should go.

I have no sympathy for those who, at dental meetings and elsewhere, strive to cast discredit upon their work and motives. Many of us have spent a great deal of time in the study of dental education, and I trust a great many have been benefited by it, and that they will be able to carry forward this profession to a much higher pinnacle of glory and fame than it now occupies. I am a little tired of the patting on the back and smoothing down we have been giving each other. If you will take up the record of the world, you will find that railroads and telegraphs, telephones, electric lights, all these wonderful improvements have been going on just at the same time the dentists have been progressing, and what I have to say to the dental profession is, "You have done well; but, remember, a hundred times better you have yet to do. It is the future you must look at."

We are not graduating dentists any more. I claim that to-day we are graduating stomatologists, not dentists, and you may think, as a great many do, that I am a little premature; but what is a stomatologist but a man who has charge of the mouth? Nothing more nor less, and he must be as thoroughly educated in the fundamental branches of medicine as the medical man himself.

Now we are struggling to bring about in our dental colleges as thorough and as broad an education as is in our medical colleges, and a little broader, a little more thorough, and a little more perfect, if possible. We have a big work before us, and I hope that we will have the hearty, earnest, and sincere co-operation of every man who loves his profession to assist in bringing about such a condition of affairs that no man who simply understands how to fill, extract, excavate, and treat a tooth and manage the teeth will be any longer accepted as anything more than a dentist. I trust we will not be satisfied with stopping at this point. I trust that we will demand of every man in the very near future that he shall be able to take and treat accurately and thoroughly, as far as science has opened the knowledge to us, the mouth and all the surrounding tissues.

(To be continued.)

First District Dental Society—State of New York.

A regular meeting of the First District Dental Society of the State of New York was held Tuesday evening, October 12, 1897, at the New York Academy of Medicine, No. 17 West Forty-third street; the president, Dr. A. R. Starr, in the chair.

After the transaction of routine business, the treasurer, Dr. John H. Meyer, made a report of the financial condition, and offered the following proposition:

Mr. President, the financial condition of this society is such that I think we are in a position to begin a good work and create a precedent that will stand for all time as a monument to this society. There is already at the Academy of Medicine a dental library, sustained chiefly by contribution, of which but very little is known by the dental profession. Dr. A. L. Northrop, in his usual quiet way, has contributed largely to this library, and, so far as I have been able to ascertain, he is the first and only dentist to generously donate his library for the use of his profession, so that all who desire may have free access to it. Dr. Northrop has contributed 576 books, 2738 journals, and 69 pamphlets.

Dr. Northrop, as you know, was an originator of this society, was its first president, and a number of times since has he filled that office, piloting the society from its birth to the present time.

We can in no better way show our appreciation and recognition than to set aside a certain amount to establish a fund for a dental library, to be known as the "A. L. Northrop, D.D.S., Dental Library Fund." In honoring him we will honor ourselves and benefit our profession more than we are able to realize.

I would therefore move, Mr. President, that this society establish in the New York Academy of Medicine a library fund of two hundred and fifty dollars, which shall be known as the "A. L. Northrop, D.D.S., Dental Library Fund." Motion prevailed.

I now move that the secretary communicate to Dr. A. Jacobi, chairman of the Board of Trustees of the New York Academy of Medicine, the action of this society. Motion prevailed.

I further move that your treasurer be ordered to pay to Dr. A. Jacobi, chairman of the Board of Trustees of the New York Academy of Medicine, the sum of two hundred and fifty dollars for the purpose indicated in my first motion. Motion prevailed.

B. C. NASH, *Secretary.*

MINNESOTA STATE DENTAL ASSOCIATION.

THE fourteenth annual meeting of the Minnesota State Dental Association was held in the Medical Building of the State University, Minneapolis, September 7, 8, and 9. The following officers were elected for the coming year: C. A. Van Duzee, St. Paul, president; L. P. Leonard, Waseca, vice-president; H. L. Cruttenden, Northfield, secretary; H. M. Reid, Minneapolis, treasurer. Executive Committee—T. B. Hartzell, chairman, Minneapolis; master of clinics, C. H. Goodrich, St. Paul; H. A. Knight, Minneapolis; W. N. Murray, Minneapolis; M. B. Wood, Mankato. Membership Committee—I. C. St. John, chairman, Minneapolis; T. B. Mercer, Minneapolis; J. B. Little, St. Paul; C. W. Nutting, Spring Valley; G. R. Day, Farmington.

The next annual meeting will be held in St. Paul.

H. L. CRUTTENDEN, *Secretary.*

RHODE ISLAND DENTAL SOCIETY.

THE annual meeting of the Rhode Island Dental Society was held at Newport, July 13, 1897. The officers for this year are as follows: P. J. Heffern, D.D.S., Pawtucket, president; C. J. Allen, D.D.S, Providence, vice-president; C. A. Carr, D.M.D., Newport, secretary; H. W. Gillett, D.M.D., Newport, treasurer; C. D. Winsor, D.D.S., Providence, librarian. V. J. Baggott, D.D.S., Providence; F. Bradley, D.M.D., Newport; R. L. Davis, D.D.S., Woonsocket, executive committee. The members present listened with much pleasure and profit to addresses by Eugene H. Smith, D.M.D., dean of the Harvard Dental School, and Julius G. W. Werner, D.M.D., of Boston.

CLARENCE A. CARR, *Secretary.*

DENTAL SOCIETY ANNOUNCEMENTS.

JEFFERSON COUNTY DENTAL SOCIETY.

THE Jefferson County Dental Society will hold its third annual meeting at Watertown, N. Y., December 13, 1897. An excellent program of clinics and essays has been prepared.

CHAS. A. FULLER, *Secretary,*
Watertown, N. Y.

Board of Dental Examiners of Pennsylvania.

The Board of Dental Examiners of the State of Pennsylvania will examine candidates on December 7, 8, and 9, 1897, in the city of Philadelphia. The location of the rooms can be learned from Dr. Howard E. Roberts, 215 South Fifteenth street.

The examinations will commence promptly at 9 A.M. of December 7, when all candidates must be present with their credentials from James W. Latta, secretary of the Dental Council.

Henry Gerhart, *President of Board of Examiners.*

EDITORIAL.

The Possibilities of Our Educational System.

The active interest manifested by the dental profession at present in the methods employed for training those who are coming into the ranks as practitioners is but the reflex of a larger interest in the general subject of education, and the result of a broader recognition of its great importance. The changes which have taken place in educational methods and educational ideals since the beginning of the present century have been nothing less than revolutionary. The present era of utilitarianism, which had its beginnings in the advent of scientific investigation and scientific discovery, has developed strength and importance *pari passu* with the growth of science in general, and the educational ideal has altered in harmony with the development of the utilitarian tendency. It has come to be clearly recognized that an education is something more than an ornamental feature, an adornment of character; it must also be useful; the individual is ranked in accordance with what he can do with his knowledge, rather than by the extent of his educational possessions.

It is this element of utility in the educational systems of the present which more than anything else characterizes them and distinguishes them from the systems formerly in vogue. It will, of course, be understood that utility and utilitarianism are here used in their broadest signification as applicable to that purpose in educational methods leading to the attainment of a definite object, whether it be material or abstract, the ability to make a useful article or the ability to achieve an ethical result.

There are at least three ends to be attained by any educational system worthy of the name, viz: 1, the acquisition of useful information; 2, the development of mental power; 3, the development of right ethical standards. These are named in the order of their normal acquisition, rather than in the order of their relative importance.

The acquisition of useful information constitutes the initial stage of education, the fact-gathering era, during which stage the student accumulates the data about which he is to reason, and out of which his intellectual structure is to be created through the educational process.

The development of mental power, of intellectuality in the student is a result attained through the training of his reasoning with respect to the information he has acquired, and is proportionate, *cæteris paribus*, to the amount of training his reasoning powers receive and the accuracy of his method.

The educational development of right ethical standards includes all of the foregoing factors, with the additional one that the attainment of the right ethical result is conditioned by the character of the data which constitute the basal material of the educational structure.

It is a too common error to regard these general features of the educational process as belonging exclusively to that period of training preliminary to the technical preparation for a professional life-work. There can be no question that the school and college are the proper arenas for establishing these essentials of education upon a sure foundation as elements of character, but, as in its broad sense education continues while life lasts, it is equally important that the same ideals and motives should govern the acquisition of knowledge from whatever sources or by whatever means it is attained. The demand of the dental profession that those who come into its ranks shall be well-trained men, not only trained as practitioners, but having that degree of mental power and breadth of culture which will enable them to take rank as investigators in untrodden fields of dental research, and above all that they shall be trustworthy, is a demand which is a righteous one and which must be met.

It is frequently quoted, when some of the products of our dental educational system are under criticism for their imperfections, that "a stream can rise no higher than its source," the implication being that the dental profession is the source of supply for the recruits annually added to its ranks. This is neither true nor is it complimentary. The schools alone are responsible for the character of the product sent out, and no amount of dodging or hedging can alter the fact. But, unfortunately, the educational game is like chess or checkers in one respect,—*i.e.*, it is always played more brilliantly by the looker-on than by the participants, and, as a consequence, much of the criticism of our dental educational methods is of the destructive sort by those who, while condemning

the method and its result, offer no suggestions for their improvement, or, still worse, demand reforms utterly impossible in view of the conditions to be met. What is needed, and what will be gladly welcomed by all honest educators in dentistry, are suggestions which can be practically utilized for the improvement of our system. Criticism of the constructive type always commands respectful consideration and is generally received.

The tendency to regard dental education as something *sui generis*, and as having but little in common with other educational processes, has been and is perhaps largely the cause of imperfection in the product of the system. That there are other causes,—*e.g.*, the commercial factor, etc., is freely admitted, but they are apart from the purposes of the present contention. All knowledge has been shown to be interdependent, and any conception of dental education which regards it in an exclusive way, as a thing apart from other educational processes, must result fatally to the methods employed under such a misconception of its relationship.

We have already noted three essential elements which should enter into all well-ordered educational systems, and we may inquire to what extent they are applicable to dental education.

As to the applicability of the first one, the acquisition of useful information, there will be no question. As a matter of fact there might be found many whose concept of dental education does not extend beyond that point, and in whose view the sole business of the teacher of dentistry is to fill the brain of the student with a store of constructive data about dentistry and train him to utilize them in the doing of dental operations. This was largely the old idea of dental education under the apprentice system, and within limits it has its value and utility, but it is not education in its broad sense. Intellectually considered, such a process is largely a training of the memory faculty, and an educational system should do more than that. It should, as before stated, develop mental power, the ability to reason correctly, inductively as well as deductively. It is the ability to impart this power, in other words to educate, using the word in its etymological sense, that constitutes the difference between the teacher and the individual who figures as a teacher, but who is little more than an animated bureau of information. The data of dentistry are sufficiently full in quantity, interesting in character, and intricate in their relationships to furnish all the basis necessary for intellectual development of a high order. Whether they lead to that result or not depends upon the educational use made of them by the student and teacher, and not on their character as facts. An appreciation of the importance of the data of

dentistry as educational means is manifested in the application of the manual training idea as an educational process with respect to the facts of dentistry. The manual training idea is an attempt at the orderly arrangement of the principles related to the materials of dentistry into a system, and the utilizing of these principles for educational purposes. To the extent that the manual training idea involves the inculcation of principles and their utilization by the student in the acquisition and application of knowledge, to that degree does it develop mental power and become truly educational. It is this motive which should govern the educational process in the so-called practical branches of dentistry, and it is here emphasized in relation to that department of the subject because the tendency has been to overlook the educational possibilities of the art side of dentistry and regard the scientific side as that having the greatest educational value as a means for developing intellectual force or mental power. That scientific study is a wholesome and desirable means for the development of mental power is a well-recognized fact, and needs no argument to enforce it. The rapid supplanting of the old literary and classical curriculum of the colleges by the modern scientific course of study is sufficient evidence of the value of scientific study as an educational means and its popular recognition.

The third factor,—viz, the development of right ethical standards, is as capable of development in our dental educational system as either of the other two factors already noted. We have expressed the belief that attainment of an ethical result in education is conditioned, among other things, by the character of the data involved in the educational process. The value of scientific study as an ethical motive force is admitted by all who are qualified to express an opinion upon that point. No man of normal mental balance can be brought repeatedly into contact with the unvarying accuracy of natural phenomena and the inevitableness of nature's laws without developing a regard and respect for truth and accuracy. He cannot deal constantly with nature without meeting her on her own basis and with a full acceptance of the conditions which she imposes. If he does not develop truth and accuracy as elements of character, he must fail as a student of science and as a man. It is therefore logically possible to utilize the dental course as a training-ground in those fundamental and essential elements that make for the attainment of correct ethical standards. It is these motives which must animate our educational systems and dominate those entrusted with the work, if a true success is to be attained and the standards of dentistry are to be elevated.

OBITUARY.

W. S. Elliott, D.D.S., M.D.

Walter Scott Elliott, D.D.S., M.D., died at Sag Harbor, N. Y., June 27, 1897, in the seventieth year of his age. He was a native of Sag Harbor, and in his youth learned the trade of jeweler with his father. Having a taste for professional pursuits, he began the study of dentistry, and graduated from the Baltimore College of Dental Surgery, after which he entered upon practice in his native town and continued therein for several years. He subsequently removed to Goshen, N. Y., where he built up an extensive practice, but was compelled, after many successful years, to retire on account of failing health. After some months' rest he attended a full course of medical lectures in Baltimore, and graduated with the intention of practicing a medical specialty for which he had prepared himself, but his strong sympathy with dentistry eventually led him to return to and again practice that profession in Sag Harbor.

Dr. Elliott was a hard student, devoted to the attainment of scientific knowledge, especially as related to dentistry and medicine. He was a frequent contributor of papers to his state and district societies, and his essays always showed careful study and research. He was the inventor of the Elliott suspension engine and of several other dental devices which have found favor with the dental profession. He was some time secretary of the Sag Harbor Historical Society and a contributor to its literature. He was an accomplished musician, and was organist of the church which he attended in Goshen, as well as of the Presbyterian church at Sag Harbor. Dr. Elliott was a man of varied attainments, but in none of them was his knowledge superficial in character; his love of truth led him to investigate thoroughly whatever department of learning aroused his interest, and his life was based upon principles which were fundamental in character.

In many respects he was not unlike the late Dr. W. H. Atkinson, who was his life-long friend.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING SEPTEMBER, 1897.

September 7.—No. 589,479, to J. C. Plunket and G. Donat. Valve applicable to vessels containing compressed gas.
" 7.—No. 589,499, to Henry H. Elbreg. Dental and surgical chair.
" 14.—No. 27,637, to Henry Weston. Design for dentists' pliers.
" 21.—No. 590,214, to Wm. Dall. Dental furnace.
" " No. 590,246, to Gustaf Valley. Dental engine.
" " No. 590,442, to L. S. Skiff. Device for forming seamless tooth-crowns.
" 21.—No. 590,460, to C. F. C. Mehlig. Dental appliance.
" 28.—No. 590,799, to L. L. White. Manufacture of metallic tooth-crowns.

THE

DENTAL COSMOS.

VOL. XXXIX. PHILADELPHIA, DECEMBER, 1897. NO. 12.

ORIGINAL COMMUNICATIONS.

SOME ADVANCE IN THE SYSTEM OF MEASUREMENT.*

BY E. K. WEDELSTAEDT, ST. PAUL, MINN.

GENTLEMEN AND MEMBERS OF THE G. V. BLACK DENTAL CLUB NO. 1:

You have been told in the past that whatsoever advance might be made in the system of measurement, so far as it applies to cavities, would be made known to you as soon as it was tested and not found wanting. A very great advance has been made, and I feel that a satisfactory use of the same for nearly eight months is sufficient warrant for me to call your attention to it, so that others may assist in proving whether my conclusions are correct or not, and whether the ideas I advance are of such importance that lasting benefit will accrue. In this way only can we hope to get a system which will be of actual use to us in our daily labors at the chair, and which will enable us to assist one another to place operative dentistry upon that high plane to which intelligent men have labored to advance it.

I desire to state now that it will not be within the scope of this paper to speak as regards the usefulness and the application of this system of measurement to crown- and bridge-work, its exceeding worth in cases of irregularity, to what extent it can be used in mechanical dentistry, nor as regards the size of the dental arch, the size of the crowns of human teeth, and how they compare with the teeth of many lower animals.

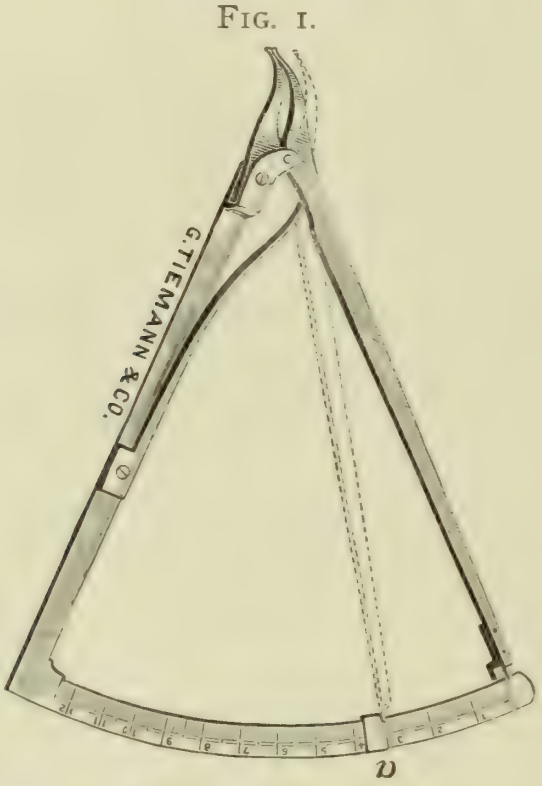
It would be impossible to go into detail as regards these different things at this time. At some future time, however, these subjects may be touched upon, and we will, beyond doubt, then have more

* Entered according to Act of Congress, in the year 1897, by E. K. WEDELSTAEDT, in the Office of the Librarian of Congress at Washington.

data that will be of much worth to us. It is a great pleasure for me to note the general interest taken in this subject by many intelligent dentists.

The first step in advance is shown by the illustration (Fig. 1). It represents the improved Wedelstaedt dentometer. The improvement consists of placing a scale on the back of the instrument, adding greatly to its value, and making it an almost universal instrument, as far as measuring cavities in the teeth is concerned. The illustration has been increased in size two diameters. I have the original instrument here, which I will pass around for you to examine. You can see what advantage has been gained without my dwelling upon it.

FIG. 1.



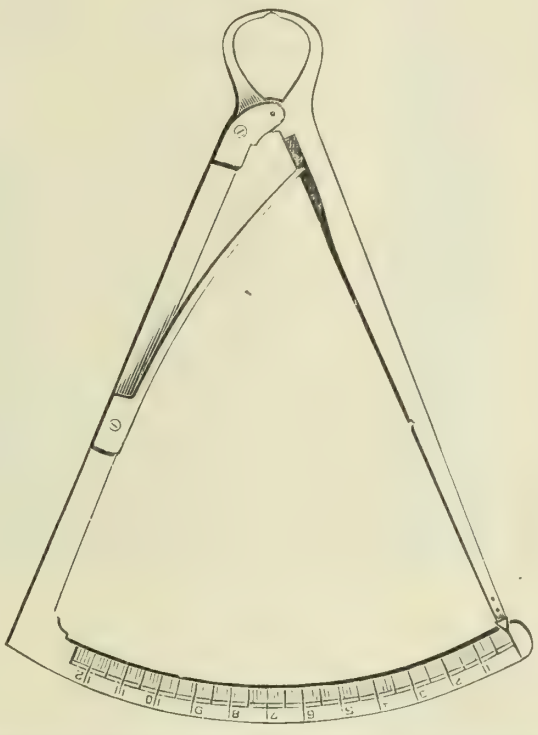
WEDELSTAEDT DENTOMETER.
a, Indicator.

Since this was written, Messrs. Tiemann & Co., of New York, who manufacture the dentometers for the dental profession, had their attention called to my improvement. They have suggested the addition of an indicator to the original instrument, which has been adopted. As the shaft is opened, the indicator moves up on the scale, where it remains when the shaft closes. The reading can thereafter be done at any time. I consider the addition of this device most excellent, as it makes the micrometer self-registering.

Not alone the dentometer, but the Grossman gauge, will, I hope, in a very short time have two scales. This will make them practically universal. The indicator, which is made of thin metal, can then have a point for registering on each side. This will be of great advantage. The instruments can be used with or without the indicator as the one using them desires.

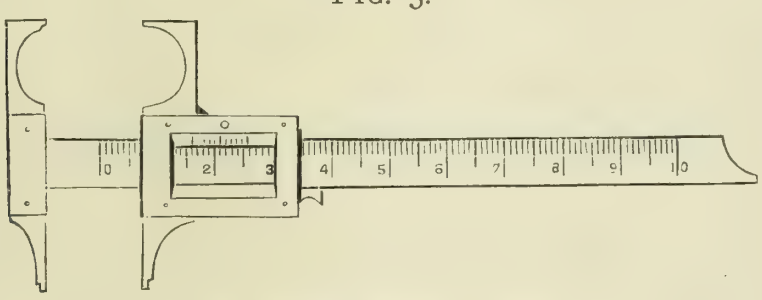
For the benefit of those who have not inspected the system of micrometers I will explain their use. The second illustration (Fig. 2) shows the Grossman millimeter gauge. This is the gauge that is used in measuring the thickness of teeth. The third illustration (Fig. 3) represents the Boley millimeter gauge. Here are the two gauges, and you can inspect them also. They register millimeters and tenths of millimeters. Each has its place and fills its particular field advantageously. I do not know that I

FIG. 2.



GROSSMAN MILLIMETER GAUGE FOR OBTAINING THICKNESS OF TEETH, ETC.

FIG. 3.



BOLEY MILLIMETER GAUGE.

can say too much about the Boley millimeter gauge. It is one of the most useful measuring instruments that has ever been invented. It is particularly fitted for the use of dentists, although made for the use of watchmakers. The man who invented it, no doubt, did not know how useful it would be to those having measurements of teeth to make. Before another year passes much more will be heard of this Boley millimeter gauge. It is being introduced into dental colleges, and the students working with it are gradually finding out how useful it is, and in time to come these young men will be graduated from the schools knowing

much more of this subject than the older practitioners, and then a system of measurement will be ours in reality.

It is indeed a great pleasure to state that, after an extended talk with quite a number of those who are teaching in dental colleges, I find that they realize the importance of having students grasp the idea that it is a necessity for them to have some idea of the size of the teeth and cavities with which they deal. The lamentable lack of information that is characteristic of the members of the dental profession at the present time concerning the length, width, and thickness of the crowns of human teeth is simply astounding. In no other profession, trade, or business is this so marked; but a new era is upon us, and the old ways are gradually giving way to new and better ones.

The name of the instrument for obtaining the width of the seat is the hedometer (Fig. 4). The illustration shows the general shape of the instruments. The set comprises four,—A, B, C, and D. They are capable of measuring the width of any seat to three millimeters. A measures the width of all seats to 1.8; B measures the width to 2.2; C to 2.5, and D to 3.0. These instruments are used for taking the width of the seats in all approximal cavities. The seat is measured from the axial wall to the outer edge of the margin of the cavity gingivally (Fig. 8, A to B). These instruments are also useful in obtaining the depth labio-pulpally, bucco-pulpally, and linguo-pulpally in labial, buccal, and lingual cavities. A complete description of each instrument is given herewith:

	Millimeters.
A,—Length of shaft	1.8
Thickness of shaft	.9
Diameter of nut	1.7
Thickness of nut	.5
Threads	130.
B,—Length of shaft	2.2
Thickness of shaft	.9
Diameter of nut	2.3
Thickness of nut	.5
Threads	130.
C,—Length of shaft	2.5
Thickness of shaft	.9
Diameter of nut	2.3
Thickness of nut	.5
Threads	130.
D,—Length of shaft	3.0
Thickness of shaft	.9
Diameter of nut	2.3
Thickness of nut	.5
Threads	130.

Anyone can, from the description and illustration, make similar instruments. All measurements of the distance between the nut and the end of the screw, which should be the exact width of the seat, are measured on the end of the Boley gauge (see Fig. 7). I should have told you that the scale on the Boley gauge on the

one side reads from right to left, and on the other side from left to right. This double scale is of greatest advantage.

FIG. 4. FIG. 5. FIG. 6.

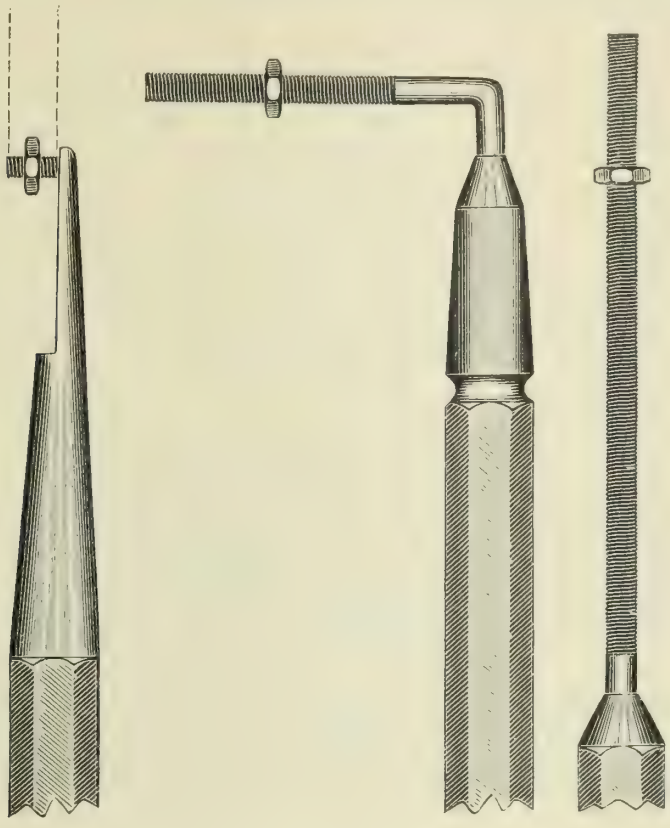
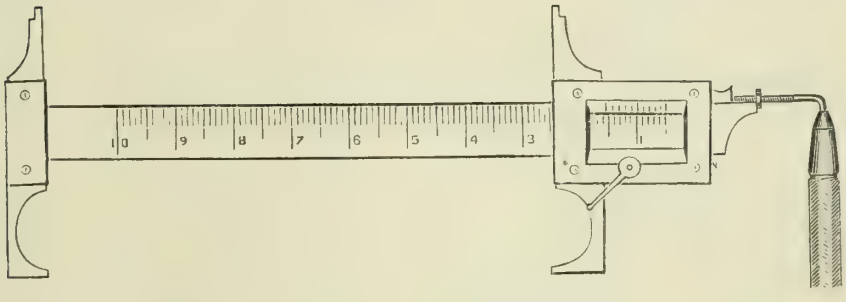
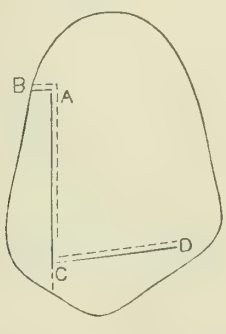


FIG. 7.



BOLEY GAUGE AND KAMPIMOMETER, ILLUSTRATING METHOD FOR OBTAINING THE MEASUREMENT OF THE DEPTH OF AN OCCLUSAL CAVITY IN A LOWER MOLAR.

FIG. 8.



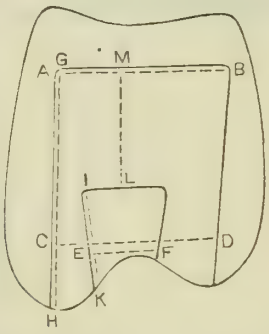
OUTLINE OF UPPER BICUSPID, SHOWING OUTLINE OF CAVITY.

A to B, seat measured with hedometer; C to D, mesio-distal length of step measured with dentometer; A to C, occluso-gingival length of the axial wall, or length or depth below the step, measured with orthometer in upper teeth, kampimometer in lower teeth.

The next illustration shows the kampimometer (Fig. 5). These large nut and screw micrometers are for measuring the depth of

cavities in the molars, and the entire length of the cavities from the seat to the occlusal margin of the enamel in the molars, bicuspids, etc., and the depth of steps, anchorages, etc., in those that cannot be measured with the orthometer (Fig. 9). The readings

FIG. 9.



OUTLINE OF UPPER BICUSPID WITH CAVITY PREPARED, ILLUSTRATING WHERE CAVITY MEASUREMENTS SHOULD BE MADE.

A to B, linguo-buccal width of cavity at gingival; C to D, linguo-buccal width of cavity at occlusal; E to F, linguo-buccal width of step. These three measurements with dentometer. G to H, entire length of the cavity from occlusal margin to seat occluso-gingivally; I to K, depth of step occluso-pulpally; L to M, length of axial wall below step. These three measurements are obtained with the orthometer where cavities are in the upper teeth, and with the kampimometer where cavities are in the lower teeth.

are taken from the Boley scale (Fig. 7), following the same method that is used for obtaining the width of the seat. There are three of these instruments; a description of them is here given:

	Millimeters.
A,—Length of shaft	11.00
Thickness of shaft	1.2
Thickness of nut	1.0
Diameter of nut	3.00
Threads	130.
B,—Length of shaft	12.00
Thickness of shaft	1.5
Thickness of nut	1.2
Diameter of nut	3.1½
Threads	100.
C,—Length of shaft	4.0
Thickness of shaft	1.0
Thickness of nut	1.2
Diameter of nut	1.8
Threads	130.

The next illustration shows the orthometer (Fig. 6). There are three of these instruments also. Some of the uses of the orthometer are: To obtain the entire length, gingivo-incisally or gingivo-occlusally, of the great mass of approximal cavities prepared in the upper teeth; the length of the axial wall below the step; the depth of the step, occluso-pulpally; the depth of the anchorage, occluso-pulpally; the depth of many occlusal cavities; also, to obtain the linguo-labio-gingival or the linguo-bucco-gingival width of some cavities that are so situated or of such a shape that it is impracticable to measure them with the dentometer, and, lastly, to obtain the lengths of crowns of those teeth that exceed

twelve millimeters. The readings are to be taken from the Boley gauge the same as for the other nut and screw micrometers. A description of each instrument is given herewith:

	Millimeters.
A,—Length of shaft	28.
Thickness of screw	1.0
Diameter of nut	2.0
Thickness of nut	.5
Threads	150.
B,—Length of shaft	15.
Thickness of screw	.8
Diameter of nut	1.7
Thickness of nut	.5
Threads	150.
C,—Length of shaft	15.
Thickness of screw	.6
Diameter of nut	1.6
Thickness of nut	.5
Threads	150. *

I do not think that it is necessary to say more in regard to these micrometers or their use. Those who wish can read the article in the May, 1897, DENTAL COSMOS, and learn more about the subject there.

Shortly after returning from New York, in February, my mind was much engrossed with a lecture that Dr. Black gave at Chicago, regarding "Some Recent Improvements in Filling Teeth." Dr. Black, in talking with me, stated, as I have told you quite a number of times, that approximal cavities should be cut broad enough so that the food in its excursions would polish the lingual and buccal margins of the fillings. If this method were followed, he held, we would be less liable to have linguo-gingival or bucco-gingival decay around the margins of the fillings. Your attention has been particularly called to this point in the past, and the cavities prepared at our clinics were so shaped, fully demonstrating this point. Now, the question was, how large to prepare the cavities, so that this state of affairs would exist when the fillings were *in situ?* I examined my records of the thickness of teeth and the size of the cavities prepared and filled in the past, and in many cases examined the teeth which had been filled, but I was far from satisfied with the condition of affairs as they then existed. For a number of years the greatest care has been exercised in so shaping approximal cavities that they would be broad enough for the margins to be free from contact with the adjoining tooth, but, on examining a great deal of the work I had done, I found the food in its excursions would not polish the lingual and buccal margins of the approximal fillings, notwithstanding all this care. Something had to be done, and I began to follow along the lines that had been laid down by Dr. Black, by preparing all my approximal cavities still broader linguo-buccally.

* The number of threads quoted for all instruments is for one inch.

The length, the width at the gingivæ, mesio-distally, the thickness, linguo-buccally, of the crown of the tooth that is going to be filled are always measured and the measurements recorded. The size of the cavity, its length and width, the width of the seat, and the length, width, and depth of the step are also all recorded.

After I had prepared and filled several cavities according to my interpretation of Dr. Black's paper and his conversation with me, I made a comparison of the width of the cavities with the thickness of the teeth I had filled, and was greatly surprised to discover that in each case the cavity was two-thirds as broad, linguo-buccally, in the molars and bicuspids, as the tooth was thick. Thus, if a bicuspid was nine millimeters thick, linguo-buccally, my cavity would be six millimeters broad, linguo-buccally. I then measured the thickness of the teeth before preparing the approximal cavities, and made the cavities two-thirds as broad, linguo-buccally, as the teeth were thick. This gave me margins that the food in its excursions would keep clean, and, not only that, it gave me margins that were much easier to polish on both lingual and buccal surfaces. This was of much assistance, as the finishing of the fillings could be expedited.

I do not wish you to understand that this rule has been applied to every case. Approximal cavities in general are referred to. Where there is not an adjoining tooth, or where the cavity is so situated in the occlusal or incisal third of the crown that any filling placed within the cavity *will be entirely free from contact with the adjoining tooth,* this rule has not been applied and is not necessary.

The approximal cavities in the upper incisors have received somewhat different treatment. The length of the tooth from the gum-line or the gingivæ to the incisal margin, on the labial surface, was measured, and then the thickness of the tooth at its thickest part. These were recorded, and two-thirds of the length and two-thirds of the thickness figured out; thus, if the length of the tooth measured nine and nine-tenths millimeters from the gum to the incisal margin, the length of the cavity would be six and six-tenths millimeters gingivo-incisally. If the thickness, linguo-labially, of the tooth was seven and two-tenths millimeters, the cavity was cut four and eight-tenths millimeters at the gingivæ, linguo-labially. This would give a cavity clearing the margins completely from contact with the adjoining tooth, and the gingival portion of any filling placed within the walls would be covered with healthy gum-tissue.

This rule has been applied to the incisors for eight months, and the satisfaction that has been derived from its use is such that I should like to hear from others, who are using the system of measurement, how their cavities compare with the size of the teeth.

In preparing approximal cavities in cuspids, bicuspids, and molars, the two-thirds rule as to the width of the cavity, linguo buccally, has been adopted.

I am unwilling at the present time to go into detail as regards the width of the seat.

The width of the step and its depth are of great importance. I will, under no consideration, have the steps in bicuspids or molars less than two and one-half millimeters broad, linguo-buccally. I desire to cut through the enamel for occlusal anchorages. The steps are broader and the anchorages are stronger in all mesial cavities than in the distal ones in the upper teeth. The reason for this has been explained in former talks on this subject.

Stress, of which we know very little and to which your attention has been called many times, plays too important a part to be completely ignored. The size of the seats, the steps, and the occlusal anchorages are governed by the amount of stress the patient is capable of exerting with the particular teeth on which we may be operating. Much more care is necessary in preparing cavities for a patient capable of biting three hundred pounds with his molars than for one capable of compressing the gnatho-dynamometer to the one-hundred-pound mark with corresponding teeth.

In calling your attention once more to these different points, it is with the hope only that we may strive to help one another and obtain at last that comprehensive knowledge that we should have as busy practitioners in a busy world, but not too busy to pay science her tribute, and having ourselves the satisfaction of knowing we have added our mite to the little pile that daily is growing larger and larger.

Opening the Bite with Cap-Fillings, Without Destroying the Vitality of the Pulps of the Teeth.

BY M. F. FINLEY, D D.S., WASHINGTON, D C

(Read before the American Dental Association August 5, 1897.)

I WISH to present to your attention a case which has been of considerable interest to me, in that I do not know of a similarly treated case, nor have I found, in my limited consultations with brother practitioners, anyone who knows of a similar one; therefore, I presume to ask your consideration of my statement of conditions and plan of procedure:

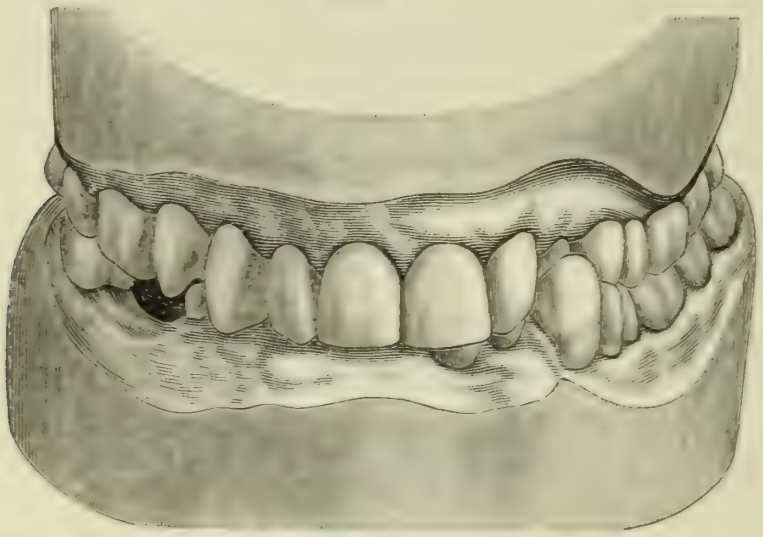
The patient, male, aged sixty-two years; every tooth present in upper jaw, and all in regular position with exception of left cuspid, which closed inside its opponent of the lower jaw; the four incisors were very much worn, so that the palatal surfaces presented a straight line, or inclined plane, from labio-incisive edge to palato-gingival line; these same incisors, when jaws were closed, came in contact with and pressed upon the lower gums. The bicuspids and molars of the left side showed some effect of mechanical abrasion, the outer cusps lapping pretty well over the outer, or buccal, side of the lower teeth opposite, the bicuspids and molars of the right side showing scarcely any wear at all. On the lower jaw the first and second molars, right side, were lost, accounting for the last-mentioned condition on the upper

jaw, at the same time throwing the work of mastication almost entirely upon the left side of the mouth, and, in consequence, causing the wear spoken of on the teeth of that side on the upper jaw, the lower teeth suffering more loss of tissue than the upper ones, and they also being, as it were, driven down into their sockets from the undue pressure, as appears in the model.

The lower incisors were worn to an inclined plane, presenting a surface opposite that of the upper incisors, the plane running from the palato-incisive edge to the labio-gingival line and the incisive edges impinging on the upper gums when teeth were closed.

My belief is that quite a good deal of the responsibility for the excessive wear of the teeth and the depressed condition of the lower teeth, left side, is due to the malposition of the left upper cuspid, one of the main abutments of the arch being so misplaced as to offer no resistance to the settling together of the two jaws; whereas, if the cuspid had been in its normal position, or had

FIG. 1.



CASE IN OCCLUSION BEFORE TREATMENT.

been forced there by regulating at the proper age, it would have been quite impossible for such a condition to have attained.

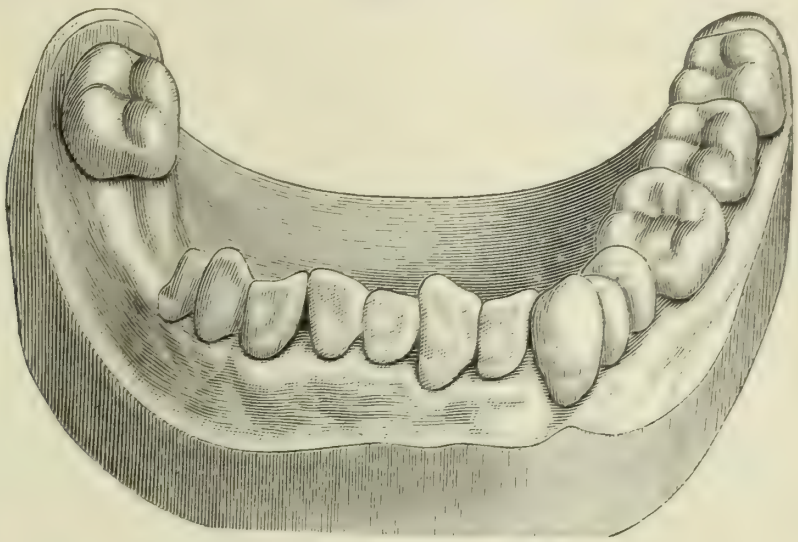
The contact of the front teeth with the gums opposite in closing the mouth, and the close proximity of the outer cusps of the upper molars of left side with the gums of the lower jaw, forcing the food in the process of mastication in painful contact with said gums, caused the patient so much discomfort that he sought relief, or at least advice, as to what might be done to the best advantage to obtain same.

After taking impressions and getting models, my first thought, or inspiration, if I may so call it, was to open the bite with cast or struck-up slabs of metal, or cap-fillings, as I have decided to designate them. How to attach the cap-fillings was the question to be solved. In consulting several of my brother practitioners, all at first seemed to oppose my plan as not being at all feasible. First thoughts or impressions are the most lasting, and there was no exception to the rule in this instance, as I persisted in my

belief that a way could be found to attach these cap-fillings which would be satisfactory alike to patient and operator.

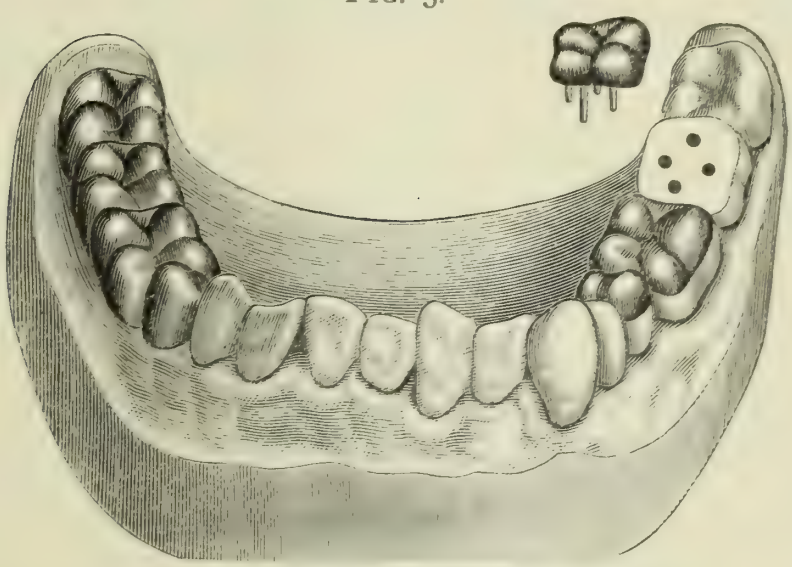
My reason for not crowning the teeth, as was advised by some, was, that too much tooth-structure would have been sacrificed upon the approximal surfaces in preparing for such a procedure to satisfy my conscience; the teeth were not decayed or broken, but were worn down; also, all the teeth had living pulps, and I was afraid to disturb the relation of the gums to the necks of the teeth as much as would have been required to have placed crowns

FIG. 2.



LOWER JAW BEFORE TREATMENT.

FIG. 3.



LOWER JAW WITH CAP-FILLINGS IN POSITION.

over three adjoining teeth with no teeth missing to afford easy access to any of the surfaces to be cut away.

Now for my plan of procedure:

The second bicuspid and first and second molars on left side, lower jaw, were restored or built up with these cap-fillings, and the second bicuspid and third molar, right side, lower, were crowned to carry a bridge to replace the lost first and second molars, the occlusion raised to correspond with the opened bite.

In preparation for these cap-fillings, the occlusal surfaces of the teeth to be capped were ground so as to make them nearly a plane,

though not absolutely so, then taking an impression in moldine, and making die and counter with Melotte's metal, struck up pieces of nearly pure gold, about thirty-two gauge, to fit these ground surfaces, and, drilling four holes in the molars and three in the bicuspid, punched holes in the little pieces of gold to correspond in position, and soldered platinum pins in them, and then united to them cusps struck up on a die-plate and filled, thus making a cap of considerable thickness.

I ought also to say that the first piece of gold stamped to fit the tooth was thickened by a second piece stamped over the first and united to the first before the pins were soldered in; twenty-carat solder was used in fastening the pins and filling the cusps, and the two pieces united with eighteen-carat solder.

As to the location of the pin-holes in the molars: I drilled them at a safe distance from the margins of the occlusal surface of the tooth in the centers of the four sides, by this means avoiding the cusps, and thereby, also, the cornua of the pulp, for, as before stated, all the teeth had living pulps.

As a result of my labors, the second bicuspid and first and second molars of the left side, lower jaw, were raised with cap-fillings, the approximal surfaces of the teeth not being disturbed in their relations one with the other, and the second bicuspid and third molar of the right side made to carry an all-gold bridge, thus raising the bite and restoring the lost masticating surface, preventing contact of the front teeth with the gums, and opening the bite sufficiently to prevent pain during mastication. The cap-fillings were fastened with cement, as was also the bridge, and all set at the same time, so as to avoid irritation by pressure on a single tooth, or on one side of jaw.

As an incident in connection with the construction of the bridge, when working on the third molar, the patient related his experience in having had a gold filling put in on the buccal surface of this tooth by one of our late esteemed friends in New York City, which required a little more than an hour in the preparation of the cavity and insertion of the filling, and for which he paid two hundred and fifty dollars.

Since that occasion, he said, he had often wondered for what purpose he had preserved this third molar, as it was really not of much use to him, the two teeth in front of it having been lost; but now he realized why it had been preserved to advantage, because it enabled him to have this bridge put in, using the tooth as one of the abutments.

The illustrations show: Fig. 1, the occlusion of the teeth at the beginning of the operation; Fig. 2, the lower jaw; Fig. 3, the nature of the work.

Anatomy, Pathology, and Surgery.

BY W. C. BARRETT, M.D., D.D.S., BUFFALO, N. Y.

(Read before the American Dental Association, August 5, 1897.)

There is no section of this association to whose papers and debates more time should be assigned than to those of Section

VII. And I may with entire truth say that none has been accorded a greater share of the attention of the members. Anatomy must, of necessity, form the basis of all our operations and treatment. Pathology is the study of all the functional changes which make necessary the services of the dentist, while to surgery we must, of necessity, look for a large share of reparative treatment.

My conception of the principal office of these sections, and especially of the reports from each, is a review of what has been in the recent past accomplished in each field. To perform this task properly would take too much of the time of the association, and I shall, therefore, but briefly summarize a few salient facts, and leave the rest to be brought out by the essayists and in the discussions.

It might be imagined that but little could be said concerning human anatomy. We are often reminded that there has been but little change in the bodily structure for some time. But there has been a great advance in our comprehension of it, and I believe that the most important facts of the past few years have been brought out through the studies and observations of dentists.

The general idea of the structure and function of the antrum of Highmore has, I believe, been wrong in the past. The textbooks have given faulty instruction concerning it, and they have recommended impracticable operations, because of these misconceptions. At the meeting of the association, held at Asbury Park, two years ago, Dr. M. H. Cryer, of Philadelphia, presented to this section a paper upon "The Anatomy of the Sinuses Connected with the Oral Cavity," illustrated by photographs projected upon a screen by the stereopticon, and by the dissections themselves, that were a revelation to many.

He showed that our previous ideas regarding the antrum were very crude and incomplete. He demonstrated that the foramen of that cavity was nearer its apex than we have usually believed, and he also showed that in many cases, at least, the infundibulum leading from the frontal sinus, instead of opening into the nasal meatus, discharged directly into the antrum, and that in this peculiarity might be found the reason for many of the incurable cases that have been reported.

Dr. Cryer also showed preparations of the inferior maxilla that have enlarged our ideas of the occasional abnormalities that appear in the structure of the inferior dental canal.

At the meeting of the association held last year, at Saratoga, Dr. Thomas Fillebrown, of Boston, read a paper and presented illustrations that still further increased our knowledge. Taking up the same subject, he showed by dissections that had been made under his directions, and by stereopticon slides, that the discharge of the infundibulum into the maxillary sinus was yet more common than Dr. Cryer had believed. He showed that as a normal condition the unciform process was continued by means of a membranous extension until it almost precluded any discharge from the frontal sinus finding its way into the nasal cavity until the maxillary sinus had filled to overflowing.

Neither of these papers has received the attention to which its merits entitle it. Dentists yet go on treating antral disease according to the old drastic measures, utterly regardless of these distinct advances in knowledge. They insert drainage-tubes and drench the sinus with powerful remedies in the good old way, just as if Cryer and Fillebrown had made no illustrative studies. There is no use in having such observations made, or in the presentation of new facts, if they are to be ignored and practitioners are to learn nothing from them. We shall never be a profession in fact and our practice will never rise to its proper importance until dentists are keenly on the alert for any new discoveries, and ever ready to take advantage of them.

In pathology there have been many distinct advances,—more than there is time for me here to consider. It is one of the most prominent indications of the distinct progress of our specialty that we are paying increased attention to pathological conditions. Our colleges are teaching pathology as a distinct branch of study, and our practice is thus constantly being broadened. Some dentists have cried out in alarm that our schools are turning out students at a rate that will soon breed starvation to the whole profession. I can but think this a very narrow view to take of professional matters. The truth is, the colleges are broadening and deepening the stream much faster than they are peopling it with occupants. So much has dental practice been extended that there is now room for ten dentists, where but a few years ago only one could live. The next generation will see dentistry much more expanded, and the time will arrive when all the diseases of the head and its cavities, aside from that of the brain, will be relegated to dentists, who have been made quite competent for this specialty by schools that teach something more than mere mechanics.

The advances made in anatomical knowledge, to which I have already referred, must necessarily modify our views of the pathology and treatment of diseases of the maxillary and frontal sinuses. These have, in the past, been a great bugbear, and our lack of comprehension has greatly complicated our practice. In my opinion, antral treatment should be much more simple than most dentists believe, when the disturbances are uncomplicated with trouble in the frontal sinus. I do not believe that in the simple degenerations induced by catarrhal conditions, and which, I think, form by far the greater proportion of them, anything more is needed than proper drainage and douching with a simple cleansing fluid, like tepid water containing a little common salt. I believe that the drainage-tubes so commonly inserted are a positive injury, and that the injection of hydrogen peroxid and pyrozone preparations are, to say the least, of doubtful utility.

In surgery the advance of the last half-decade has been remarkable. In no part of the whole general practice has this been greater than in oral surgery. Dentists are coming forward and occupying the field which they should have cultivated years ago. The general surgeons in most of our larger cities are now refer-

ring to the oral specialist operations that, ten years ago, he would almost as readily have sent to the drug clerk. And why should this not be the case to a greater extent than it now is? The general surgeon seldom attempts operations in gynecology. They are referred to the specialist. The oculist now looks after all surgery of the eye, and usually of the ear. To the orthopedic surgeon are referred deformities of the extremities, and to the dermatologist the removal of superficial growths. Why should not the oral surgeon take up all operations upon the organs and tissues, to the study of which he devotes his life?

It has often been argued that dentists are not worthy the name of professional men, because they have no regularly organized benevolent dispensaries,—that they do little professional charitable work. It is a basal truth that upon all real professions and professional men the poor have an indisputable claim. No medical man has the right to withhold his professional services from a suffering individual because he is without the means of recompense. The lawyer recognizes the right of the penniless person to advice gratis at his hands when his personal or property rights are invaded. The courts assign counsel to accused or legally involved people who are without legal advice, and the lawyer who should refuse to accept and give his best services to such poor people might be disbarred from practice. No clergyman would deny religious consolation to anyone who needed it, and the more deserted and friendless he might be, the more imperative and incontestable would be his claim.

Dentistry, which loudly demands public admission of its professional status, has so far done little for the poor. We recognize, and ask others to recognize, the necessity for dental services in the promotion of the health and comfort of the public, but we have, so far, done almost nothing toward extending it, unless we were well remunerated for it. If we are to claim a professional status, this should be remedied. Competent dentists and oral surgeons should accept and even seek for positions upon the staffs of hospitals, and should then give enough of attention to their duties to insure proper dental and oral services to all hospital patients who demand them. They should qualify themselves to take entire charge of those, in both the surgical and medical wards, who have any oral diseases whatever. This will give to us the recognition that we demand, and we may all rest assured that, however loudly we may vapor and vaunt our merits, acknowledgment will only come when we have honestly earned it, and when that is done it will not for an hour be denied us.

Brophy's operation for the radical cure of cleft-palate dropped like a thunderbolt upon surgery. His proposition to operate within a few hours of birth was at variance with all surgical practice. The very idea of forcibly bringing together the sundered osseous palate-walls, and retaining them until they had united, was something revolutionary. Yet it has proved eminently practicable and successful. As good an authority as the eminent surgeon Senn pronounces it the greatest surgical advance of the

decade. Many dentists are not acquainted with the operation or its advantages. That is a serious reflection upon their own professional knowledge and intelligence. If they are competent practitioners, it is their bounden duty to know the merits or the demerits of every such novelty in practice.

The operation for the resection of the inferior maxillary nerve and artery, devised and presented to medical science by the same very competent surgeon, was another new and startling advance, which commends itself by its simplicity and completeness. It consists in so enlarging the mental foramen as to admit of the passage of a kind of exaggerated Donaldson broach, which is pushed back to the neighborhood of the inferior dental foramen, when by a few turns it engages blood-vessels and nerve together, and they can be completely and cleanly drawn out in the same manner, and quite as effectually, as the dentist removes the contents of a pulp-canal.

This operation offers a complete confirmation of the observation of the anatomists, who claim that all the text-books and preparations that represent the nerves and blood-vessels of the dental pulp as going out at the dental foramen and traversing the tissues until they join the internal dental artery and inferior maxillary nerve in the inferior canal are travesties of the truth. By the removal of the whole contents of the canal, the vitality, the innervation, and vascular supply of the dental pulp is not in the least interfered with. The books and artificial preparations should be corrected so as to conform to these facts, and to give the truth, and that is, that the entire blood- and nerve-supply of the tooth is from the pericementum, which is a kind of placental organ designed, among its other functions, for this special purpose.

In confirmation of the truth of the observations and dissections of Professors Cryer and Fillebrown, Professor Brophy has lately performed another rather novel operation for the relief of empyema of the frontal sinus.

Scientific dentistry should carry its investigations outside the fields in which it operates for sordid money considerations. The world has a right to call upon it to properly cultivate the field which it has adopted. If we study only the bread-and-butter aspect of our calling, what right have we to say that we are scientific men? If we do not proceed any further, we are only business men, striving to extend the limits of our calling that we may make a little more money in the new fields. We shall never fully comprehend our vocation in all its aspects until we study the teeth as a whole,—until we consider the dental organs of other animals beside man. What would be thought of ophthalmology if it never compared the human eye with those of other animals? Where would be its claim to a professional relation if it looked at nothing but the money side of the calling?

So, if dentistry is to make good its boasts that it is a "scientific," "professional" avocation, it must delve into something beside the pocket. It must study something more than the belly. It must rise to a broad consideration of the correlations of its

existence. It must look at the teeth from another standpoint than that of organs to be filed, and scraped, and excavated, and filled, and substituted, for the purpose of supplying pabulum to exercise our own teeth upon. We must go out into the broad field of nature and examine these organs in all their relations. There are none that afford so much light to the anthropologist, and there are none that so plainly evidence the differentiation in species that must have formed so large a portion of the past history of the human race, to say nothing of the other orders and species of animal life. We want to know something of teeth aside from their diseases. Until we rise to this, we will be looked upon as just what, under those circumstances, we would be,—mere mechanics, artisans, workmen by the day, the hour, or the job.

It was with a view to that development of these higher aspects of dentistry that, immediately after the last meeting of this society and my acceptance of the chairmanship of the section, I commenced the work of preparing an exhibition in comparative dental anatomy, that might be illustrative of the various forms of dentition in the different classes, orders, and species of animal life. I have a considerable number of specimens myself, and have been instrumental in placing in more than one institution collections that should stimulate to scientific study. In the rooms of the Odontological Society of the city of New York is a collection that has, so far, been without a rival anywhere in the world as a scientifically arranged and classified museum of specimens in odontology. Without the facilities and assistance of Ward's Natural Science Establishment, of Rochester, N. Y., I could not have succeeded in getting together that collection, and now they have enabled me to present to the American Dental Association such an exhibition as, I believe, was never before made, and which will be found in an adjoining room.

I am but too well aware that a certain class of men will say of this, as they have said of other exhibitions that I have made before this society, "Oh, that ain't dentistry!" Well, quite possibly, it is not their kind of dentistry.

But I am thankful to say that there is a class of educated, intelligent men coming into our profession, who take broader views, whose dentistry is not quite so narrow as that of the practitioners who have no conceptions of anything save mechanics, and who have so far mistaken the character of their calling as to place it on a par with the avocations of the blacksmith, the jeweler, and the shoemaker.

It depends upon the reception that shall be given this rather novel departure as to whether the time of our National Association shall be mainly devoted to amalgam and red rubber, to mechanical clinics and demonstrations, or to the scientific and educational problems involved. Let it not be understood that I depreciate or undervalue the practical affairs of our profession; but I believe that the time given by our representative men to our national organization should be devoted to the broadest scientific problems. The place for clinics and elementary discussions, for

kindergarten work, is in local society meetings. Let us here try to do something for our national professional fame and for the elevation of the higher interests of dentistry.

The collection will speak for itself. I sincerely trust that it will be carefully studied, and that it will be a source of illumination. To this end I commend it to you all, and hope there is not one present who will not be benefited by it. It was not collected and is not exhibited to gratify mere idle curiosity, but to give opportunity for earnest scientific study.

I have not time here to enter upon any learned disquisition concerning it. You will find it scientifically classified and labeled, and Mr. Charles H. Ward, who is in attendance to exhibit it, will be glad to answer any questions, and I shall be only too happy to explain anything in connection with it at any time when the association is not in session.

A Case of Antral Disease Involving the Frontal Sinus.

BY TRUMAN W. BROPHY, M.D., D.D.S., CHICAGO, ILL.

(Read before the American Dental Association, August 5, 1897.)

By request of the chairman of this section, I have, since coming to this meeting, prepared a report of a case which verifies the statements first made by Dr. M. H. Cryer, of Philadelphia, showing direct communication of the frontal sinus with the antrum of Highmore.

During the spring of 1896, a patient was brought to me by a physician, and on examination I found that the upper right bicuspid and molar teeth had been removed. A small opening had been made into the antrum. Irrigation was carried on by syringing the parts daily with the usual antiseptic solutions, but satisfactory progress in arresting the disease had not been made, and the patient was brought to me for diagnosis.

Exploration of the cavity by means of a silver probe revealed no diseased bone, and the treatment recommended was more extensive opening and more thorough drainage. The opening was increased to some extent, better drainage secured, the usual treatment employed for irrigation and cleanliness, and the patient seemed to improve under this treatment, suppuration being to a very great extent diminished, but not wholly arrested. The patient returned home, and was under treatment there for two or three months, when she returned in about the same condition in which she was when I first saw her. It was then that I decided to remove a greater portion of the anterior wall of the antrum, that I might make an ocular examination of the cavity and employ such treatment as the condition of the parts suggested. On opening the cavity I found a thickening of the mucous membrane, and polypi upon its surfaces, beside a small piece of flexible rubber tubing, used for drainage, which had been lost in the cavity by the gentleman who had treated the case. The cavity was thor-

oughly curetted, packed with boracic gauze, and on the following day the gauze was removed, the cavity irrigated, and the surfaces carefully examined, with a view to discovering any diseased tissue that might possibly have remained. The cavity was packed daily for a period of about a week, when a hard rubber canula was made, retaining the full size of the opening. A flange was allowed to extend over upon the oral mucous membrane, thus preventing the canula from passing into the antrum. The pressure of the cheek held this canula in place. This prevented the closing of the opening by granulations, and enabled me to thoroughly irrigate the cavity and watch the process of repair.

The membranes of the antrum, under antiseptic cleanliness and stimulation, soon returned to their normal condition, but there was still an accumulation of pus at the upper nasal surface of the cavity. After the lapse of two or three months, under the most vigorous treatment that could be employed, with a view to arresting this suppuration (the effort being unsuccessful), I decided that the frontal sinus must be involved. Accordingly, in the presence of Professor Barrett and others interested, I performed an operation at the Presbyterian Hospital, opening the sinus, which I found was filled with pus. The anterior wall of the frontal sinus was removed, so as to expose the greater portion of the cavity to view. It was found to be denuded of membrane, and, on carrying the incision downward along the inner canthus of the eye, I was able to introduce a silver probe and carry it directly into the cavity of the antrum without obstruction. Having succeeded in doing this, water was forced into the frontal sinus, and readily found its way through into the antral cavity. Then, removing a portion of the nasal bone of the affected side, I found that pus also dribbled from the region of the ethmoid cells. These cells were curetted, some diseased bone removed, and the surface, together with the frontal sinus and antrum, thoroughly irrigated. The wound made for the opening of the frontal sinus was closed, a drainage-tube, or rather a tube for the purpose of introducing fluids for irrigation, was introduced, and the parts dressed with antiseptic gauze, thus completing the operation. Fluid, boracic acid solution, was daily made use of for irrigating the parts, being introduced through the tube. Suppuration continued for a short time, but finally ceased. There is no suppuration of the parts at present, but there is still a thick, glairy mucus which occasionally comes from the nasal cavity, and which is formed, no doubt, upon the nasal mucous membrane. This case, in my judgment, had its origin from a dento-alveolar abscess. The teeth affected were removed before the patient came to me. The antrum became involved, and the mucous membrane of the antrum being continuous with that of the infundibulum, frontal sinus, and ethmoid cells, this membrane became diseased, involving the cavities named.

It is scarcely necessary for me to state that cases of this character could not possibly be cured by the opening and treatment of the antral cavity alone. In the treatment of these cases, dis-

eased bony tissue must be removed, the parts thoroughly irrigated two or three times a day with antiseptic solutions,—and there is none better than a solution of boracic acid,—and then, in the event of suppuration being difficult to arrest, the agent which, in the destruction of infectious material, now extensively employed, in Europe especially, which is not new to us, but which is most efficient in its action, is nitrate of silver. It may be used in cases of this kind in a strength of about two per cent.

The feature of the case which the chairman of the section especially desired me to present was the anatomical relation of the frontal sinus, infundibulum, and antrum of Highmore.

Structural Development.

BY C. N. PEIRCE, D.D.S., PHILADELPHIA, PA.

(Read before the American Dental Association, August 5, 1897.)

The chairman of the section on Anatomy, Pathology, and Surgery has presented to you an array of landmarks rarely seen in a meeting or an association of professional individuals unless of a strictly scientific character. Each one of these representatives has a history, and from each one, the nearest akin, but more complex, has derived some organ, trait, or peculiarity essential to his being; and this is true from the most simple to the most complex, from the batrachian to man.

These traits or organs which are held in common, and uniting one species with another, are indicative of the road that has been traveled from the most immature or primitive to the most complex or highly specialized of the whole animal series.

Professor Barrett has endeavored to present, for your pleasure and instruction, representatives of the animal, or, more properly, the vertebrate series, and in this collection we have the elements of a study in comparative anatomy.

Dissimilar as these representatives are, when compared one with another on a superficial examination, we should find, on a careful and critical study of each, that they would pretty clearly demonstrate that the general plan of construction was a unit and that the divergencies were in response to the necessity of adaptation to environment, intensified by inheritance.

The development hypothesis maintains that all existing species have been derived from species of pre-existent geological periods as offspring or by direct descent; that there has been no total destruction of life in past times, but only a transfer of it from place to place, owing to changes of circumstances; that the types of structure become simpler and more similar to each other as we trace them from later to earlier periods, and that, finally, we reach the simplest forms consistent with one or several parent types of the great divisions into which living beings are naturally distributed.

The evidences of derivation of species from species within the

limits of the genus are abundant. It is not the extent and degree of difference that determines the definition of species from species, but it is the permanency of the characters in all cases and under all circumstances, and the certainty of these being transmitted to progeny.

Species may be either restricted or protean, the latter embracing many, the former few, variations. This is illustrated in the varieties in plumage and other peculiarities or characteristics in fowls, canaries, pigeons, ducks, hogs, cattle, and horses. If some of these intervening forms were destroyed, so as to leave a gap between definable groups of individuals, they would be very naturally designated as a species. That such variations and destructions have been going on from the beginning of life is now well recognized. It is a recognized fact, also, "that any change in the circumstances—that is, in the sum-total of influences affecting any organism—will be likely to work some alteration in that organism or its descendants, or in both." Chief among these external influences are: Food, soil, light, climate, attacks from enemies, either of its own or other species; also, cold, floods, and draught, all of which are factors in the struggle for existence.

A hasty glance of the several departments, commencing with the most simple, may not be out of place.

First. Protozoa (amœba, rhizopods): Animals which have neither a general body-cavity nor a nervous system.

Second. Polystomata (sponges, corals, etc.): Animals which have an internal cavity, and usually many inlets, with no parts or organs set aside for special purposes, but consisting of many cells.

Third. Cœlenterata (jelly-fish): Animals with a stomach-cavity, and a body-cavity extending out from this. The parts of the body are arranged regularly around a center, as the spokes of a wheel around the hub. They have a radiate symmetry.

Fourth. Echinodermata (star-fish, sea-urchins): Animals with a body-cavity separate from the stomach, a nervous system, and a system of water-tubes. These aid in locomotion. The symmetry approximately radiate.

Fifth. Vermes (worms, leeches): Animals which consist of two halves—bilateral symmetry—composed of a series of segments. Have no jointed limbs.

Sixth. Mollusca (shell-fish, oysters, snails, etc.): Animals which have soft bodies, covered by a mantle. No jointed limbs. Something resembling a heart and blood-vessels forming a circulatory system. Often a shell outside the body, and a nervous system in which quite frequently there are not two equal or nearly equal sides to each part.

Seventh. Arthropoda (crab, spider, etc.): We have in these, both carnivorous and herbivorous, animals which have bodies made up of a series of joints, a symmetrical nervous system, some of which have a skeleton outside of the body, and jointed limbs.

Eighth. Vertebrates: The back-boned animals, which have a skeleton within the body, a brain, and a back-bone.

These are of five classes, as follows: Fishes, amphibians, reptiles, birds, and mammals.

The latter, mammals, are the warm-blooded animals, which are largely represented in the various specimens exhibited by the chairman of the section, and in which we, as dentists, are largely interested because of the diversity of teeth which they present for our examination and study. They consist of sixteen orders, and may be named as follows:

1. Monotremes: Australian duck-bill.
2. Marsupials: Kangaroo, opossum, etc.
3. Edentates: Armadillo, ant-eater.
4. Sloths: An edentate and arborial.
5. Siren: Dugong, manatee, herbivorous mammal.
6. Ungulates: Horse, hog, deer.
7. Cetacea: Whales.
8. Pinnipeds: Seals.
9. Carnivores: Cat, dog, tiger, etc.
10. Hyracoids: Conies, pachyderm and arborial.
11. Rodents: Rats, mice, rabbits.
12. Proboscides: Elephants.
13. Lemurs: Small, monkey-like, and arborial.
14. Insectivores: Moles, hedgehogs.
15. Cheiropters: Bats.
16. Primates: Monkeys, apes, man.

The teeth are of more interest to the dental profession than any other set of organs considered separately, and yet these organs, subserving nutrition, cannot be studied without a marked correspondence with other organs being noted, and to that extent is this true, that one familiar with the science of paleontology, given the shape and structure of a tooth, the animal itself could almost be constructed, and, without doubt, its mode of progression, its food, and its habits of life could be quite fully portrayed.

A very interesting and suggestive query is, "Are the teeth, with other organs of living beings, adaptive or non-adaptive? Are they machines especially fitted to meet the demands of their environment, or are they not?"

Another not less interesting question is, "Did the occasion for its use follow the appearance of the structure, or did the need for the structure precede its appearance?"

The following answer to these questions, as given by the late Professor Cope, is certainly intelligible and rational: "Animals and plants are dependent for existence on their environment. It is an every-day experience that changes in environment occur without any preparation for them on the part of living things. If the changes are very great, death is the result. It is evident that the influence of environment is brought to bear on life as it is, or has been, and that special adaptations to it on their part must follow, not precede, changes of climate, topography, population, etc." Another very important consideration to add to this one is the well-known and recognized influence of use, motion, nutrition, not forgetting that pressure, impact, induced density,—"The law of use and effort."—*Kinetogenesis*. Structures are produced or established by animal movements.

No series of anatomical structures have proved of greater utility to the student endeavoring to indicate the exact relationship or history of mammalian forms than the teeth. He who attempts to master the subject is likely to be discouraged at the very threshold of his undertaking by the apparently very great diversity of tooth-forms with which he meets in the class mammalia. Dr. Wortman says, "If a little careful attention is bestowed upon the plan of organization of the teeth of certain groups, it is not difficult to discover that there are certain central or primitive types from which it is easy to derive other related forms of dentition by simple addition, subtraction, or modification of parts already possessed." Teeth in the mammalia are defined as hard structures attached to the mucous surface of the oral or anterior extremity of the alimentary canal; their chief function is to subserve nutrition by the seizure and comminution of the food. Morphologically considered, however, they are specialized dermal appendages, characterized by the pressure of certain calcified material, giving them density and forming a material known as dentin, though to other epithelial or cuticular structures, which are not so solidified, found in invertebrates and in a few lower forms of vertebrates, the term tooth has likewise been applied.

While they all subserve nutrition, and are, therefore, analogous in their function, their chief distinction consists in the fact, so far as known, that these latter consist of a corneous or horny substance, which is derived from the more superficial epidermal layer, and are, therefore, *ecderonic* in their origin. In the former, teeth of vertebrates, a papilla arises from the corium, and undergoes more or less calcification from its summit downward by a deposition in its substance of lime-salts, forming dentin. The dentin thus formed is a hard, elastic substance, consisting of closely-set tubuli, branching as they go, and whose crown may or may not be invested with an exceedingly hard (the hardest in the animal economy) and unyielding substance derived from the deeper layers of the epidermis, known as enamel. These are then *enderonic* in origin. Those of ecderonic origin are the so-called teeth of the annulosa or leech, the mollusca and insecta of the invertebrates, while the vertebrates with such teeth are represented by the teeth of the ornithorhynchus, palatal plates of the sirena, and the horny teeth of the lampreys, though if these structures are to be classed as teeth, can we exclude the *baleen* of the cetacea and the beaks of birds and reptiles. They certainly are analogous, so far as being an *oral armature*, and with similar function; but beyond this they have nothing in common with the teeth of enderonic origin, which in shape and function range from a simple cone, for seizing and retaining, to the incisors for cutting, cuspids or canines and carnivorous molars for tearing or lacerating, tuberculate teeth for crushing, and the complex grinding molar of the omnivorous and herbivorous for the trituration of food.

Continued Study of the Relations of the Frontal Sinus to the Antrum.

BY THOMAS FILLEBROWN, M.D., D.D.S., BOSTON, MASS.

(Read before the American Dental Association, August 5, 1897.)

Last year I made a report of some observations I had made on the formation of the infundibulum, showing that in many cases it continued directly to, and terminated in the foramen of, the antrum, and that a fold of mucous membrane mentioned by Merke, in 1834, extended above the foramen, forming a pocket, from the bottom of which the opening into the antrum is situated, thus directing any discharge coming down the infundibulum into the antrum, so that, under ordinary circumstances, no abnormal discharge from the frontal sinus would escape into the nasal passage until the antrum was filled so as to cause a backward overflow.

I mentioned the fact that Tilleaux, about 1840, noticed that of fluid injected into the frontal sinus a great part flowed into the antrum, and that Dr. Cryer, in the same year, mentioned the same circumstance. He also showed that a probe could be passed from the antrum into the frontal sinus. I also noticed that Byran had mentioned the fact of occasional communications between the cavities, but considered them anomalies, and that Professor Harrison Allen had discussed the proliferation of empyema of the frontal sinus into the antrum. These observations were of isolated cases, and were not proven or considered indicative of the normal anatomy of the parts.

I reported that the examination of eight different subjects showed that the infundibulum continued as a deep groove, or tube, open on one side down to the foramen of the antrum, and terminated in it, in every one of the eight cases, and that the pocket described was present in seven of the eight. This seemed to imply that the continuation of the infundibulum to the antral foramen and the presence of the pocket membrane was the normal formation. During the past winter I had opportunity to examine fifteen heads in the Harvard dissecting-room, and found the infundibulum continuing to the foramen of the antrum in every case. The membranous fold was present in every case, except on the left side of one subject. In this case the process was broad and flattened toward the meatus, and, though the mucous fold was absent, the widened process served the same purpose, as it formed a cup-shaped cavity quite as capacious as the pocket on the other side.

In another case the mucous fold was thickened and had considerable muscular tissue intermingled in its substance.

On the right side of this subject the infundibulum was very large, and in place of the ordinary foramen there were two openings, both quite large, fully one-fourth of an inch in diameter.

In another case the pockets were large, irregular in form, and deep, the mucous fold completely covering the infundibulum from the foramen of the frontal sinus to the antrum.

In one subject the mucous fold was considerably calcified. This condition had obtained to a degree throughout the whole system. This subject was advanced in years. This makes a total of twenty-three cases, a number, I think, sufficient to establish the fact of the normality of the anatomy of the parts.

The very few variations only prove the rule. I hoped to secure the co-operation of others in making further examinations during the winter. but the reprints of my paper were too long delayed, and the dissecting season was passed before I could communicate with anatomists and make the necessary arrangements, and have the benefit of the results of the examinations of other subjects.

Replantation in Pyorrhea Alveolaris, with Description of a Method for Correcting Malposed Teeth and Splinting Loose Teeth in Position until Firm.

BY ROBERT EUGENE PAYNE, M.D., D.D.S., NEW YORK, N. Y.

(Read before the Southern Dental Association August 3, 1897.)

In the history of implantation, transplantation, and replantation of the natural teeth, probably replantation is the most successful. Innumerable replantations have been reported in good condition at the end of twelve and fifteen years.

This may be accounted for in the fact that the tooth is immediately replaced, that it fits the socket accurately, and that a portion of the membrane remains intact. If there is no infection these membranes act as a scaffolding, or not unlike a sponge graft, and in them loops of vessels quickly form, thus aiding in the formation of a provisional callus, which later becomes dense bone.

In pyorrhea alveolaris, when the teeth have become very loose and partly pushed out of their sockets, assuming distortions and malpositions by elongation and mal-occlusions, it becomes necessary to use extreme measures to correct the condition. If not corrected and treated the case is hopeless, and the teeth drop out one by one. Many of the conditions can be corrected by persistent effort. It requires sincerity of purpose, patience, and persistent care while the case is in hand to effect a cure.

The busy general practitioner will not give the cases time and attention. He wants quick results and will not be bothered; therefore recommends extracting as a quick way out of trouble, when he should turn them over to the specialist, or one willing to give the time and familiar with the surgical treatment this disease requires.

I have not read in any of the journals an article outlining the plan of treatment I usually follow. Many well-written articles discuss probable causes at length, and devote a very brief page to treatment. Therefore, believing that I go to the surgical limit in my efforts to effect a cure, I shall give in minute detail description of a case that covers the ground most thoroughly. I will include a method of correcting malpositions, projecting anterior teeth.

and changing ill-shapen teeth, together with the manner of splinting, so important to obtain desired results.

History.

Mrs. A., New York, forty; well-to-do, and willing to pay for treatment, consulted three or four reputable busy practitioners during past three years for treatment of pyorrhea. She was informed that three of the front teeth must be extracted and replaced by a plate. She refused to wear a plate, and the family dentist, at her request, wired two of the teeth in, that they might last a little longer. (Herewith are casts showing mal-occlusion, deformity, and the wire in the central incisor and bicuspid to keep them from dropping out.)

She was referred to me for special treatment. There was marked mal-occlusion,—the upper and lower front teeth are crowded between the canines, the lower lateral laps over the canine and pushes the upper central and lateral forward, producing a very unpleasing effect. This long tooth had been a source of annoyance to the patient for years. It was so prominent that it was included in her passport description. Here was a deformity to overcome and a disease to eradicate.

All the teeth were loose; the upper right central, lateral, and left bicuspid were almost out. These teeth were elongated, and their sockets almost obliterated. Careful examination and testing revealed five dead pulps, gums congested and painful, and discharging pus.

Treatment.

Two of the dead pulps were in molars. These were opened and treated in the usual manner; that is to say, contents of pulp-chambers and canal sterilized with twenty-five per cent. pyrozone. I usually open up the tooth, place pyrozone in on piece of cotton, and place my thumb over opening. This drives it into root, and if abscessed will sterilize beyond the apex of root. Care must be taken to use a small quantity and not close the opening too long, or pain will be inflicted.

Pyrozone is not a caustic in the true sense. It does not destroy normal tissue, for circulation is soon resumed after its application. It will penetrate and destroy bacteria and change ptomaines and decomposing compounds, so that a tooth so sterilized may be soon sealed.

The roots of these teeth after treatment were filled with paraffin and salol. The next step was to take three teeth at a time and, by means of the Riggs and Younger scalers, remove most thoroughly the calculus around the roots. This was rendered almost painless by the aid of a two per cent. cocain solution containing a third glycerol and a few drops iodin, applied with a curved needle, blunt point, placed in bottom of pockets. A very perfect anesthesia can be obtained in this manner.

Pockets were now washed out with boiled water (warm), with a long, curved syringe, and with a blunt metal point a drop or two

of five per cent. pyrozone is introduced in the pocket. This in turn was washed out. The gum was now dried, and also the pocket, as far as possible. With another minim syringe, at the bottom of the pockets was placed two or three drops of concentrated solution of lactic acid. This finished the three teeth, with the exception of splinting, which I will describe later.

At a subsequent sitting the roots of three more were treated, until calculus was most thoroughly removed from all the teeth, and pockets treated. A few drops of pyrozone, three per cent., applied by means of a tooth-brush, were prescribed for morning and evening use, and a mouth-wash during day.

The next step was to reduce the size of the four lower incisors. By examining the models you will see what is meant by this. They are made narrower, the cutting-edges evened up, and all drawn in position by means of a C. & D. silk twist. The threads are renewed two or three times a week, and if tied carefully and taut will shrink, drawing the teeth in place. The lower teeth in this case were corrected in shape at one sitting and drawn in position in two weeks.

They were splinted by being bound together with "00" silk twist,—the finest strand obtainable, but when waxed it is quite strong; and if properly put on and square knots used will hold the teeth securely ten to twenty days before it becomes necessary to renew them.

The next step was to inject cocain around the three loose teeth and extract, which I could have done with my fingers. The pulps were dead in all. The teeth were sterilized, contents of pulp-chamber removed, root-canals filled with paraffin and salol. The gum on each side of the sockets from which the teeth were extracted was injected with five minims of a two per cent. cocain solution. The sockets were sterilized with pyrozone, and with Ottolengui bone-drill the three sockets deepened sufficiently to receive the teeth. The bony tissue was very dense at the bottom of the partly obliterated sockets. The upper right central had been ground off from time to time as it elongated, and when replaced in its new socket it was too short; but by reducing the size of the upper four incisors I was enabled to get them in the arch between the canines. These were splinted for thirty days, and then a gold plate swaged to fit over the cutting edges, as shown by the model. This plate was worn until the teeth became rigid,—about three weeks. The teeth being mature, hard, and sound have every chance for years of comfort and usefulness, besides being beautiful and all her own.

The result is quite pleasing to the patient, for she never for a moment thought it possible to correct the irregular teeth in treating the disease, when, as a matter of fact, this was necessary to effect a cure.

I would call attention to the absolute necessity for carrying out the plan of treatment as detailed to get a result. Summarized, it is as follows:

Treatment of pulp-cavities and filling roots;

Reducing size of teeth to correct irregularity, correcting malocclusion thereby;

Deepening sockets and replanting three teeth, after removing cause of elongation;

Removing serumal calculus;

Splinting and, above all, surgical cleanliness throughout as far as possible.

Calcic phosphate was prescribed in this case for thirty days, to aid the cell in the rapid deposit of bone around the roots of the teeth.

Great care should be exercised in deepening the sockets to not destroy the outer thin wall.

To make sure that the teeth replanted are surgically clean, I place a few fine crystals of resorcin on the apex of the root, just before placing it in the socket. These crystals dissolve readily, and the small wound heals quickly with very slight soreness. The teeth become firm in thirty to sixty days after splinting.

The Prosthesis of Entire Dentures with Countersunk-Pin Teeth on the Vulcanite Base.

BY ALLISON R. LAWSHE, D.D.S., TRENTON, N. J.

For the purpose of imitating the natural organs and obtaining the most useful, comfortable, and artistic denture, the countersunk-pin teeth are, perhaps, as superior to plain teeth as are the latter to the sectional block, for the reason that, when selected with due regard to the temperament of the individual and mounted upon a properly constructed artificial base, they present to the tongue organs similar in form to those of the natural denture, and, with the assistance of the palatal gum-festoons and rugæ, materially aid the tongue and cheeks in manipulating the food, as also in deglutition and enunciation. Beside, if the lingual, as well as the labial, surfaces of both the upper and lower vulcanite plates be faced with pink rubber, exposure of artificiality will be avoided.

My method of procedure is as follows: After obtaining an accurate model of the mouth from a plaster impression, and the "bite" by the How method,* and after setting up the case in the articulator, I coat the model with gum tragacanth mucilage and cover it with a sheet of No. 3 tin-foil, rubbed neatly to place with a ball of cotton under the finger, and, with a thin sheet of wax pressed carefully to place to avoid forming places of extreme thinness, as over the air-chamber and rugæ, I form the temporary base-plate and proceed to set up the teeth with especial care to attain a natural-looking arrangement. This accomplished, the wax forming the gums may be artistically modeled and carved with a small vulcanite scraper and the festoons formed by Dr. M. L. Fay's easy, yet effective, method, which is to arrange a

* "New Bite-Taking Means and Methods," by Dr. W. S. How, September and October, 1894, Dental Cosmos.

waxed, closely woven cotton string about the necks of the teeth with a suitable instrument, uniting the string and wax with a spatula and smoothing the case with a fine blow-pipe flame; the string to be removed with the wax when the case is ready to pack. With the countersunk-pin teeth I employ this expedient with pleasing results on the lingual as well as labial and buccal surfaces; moreover, in a similar manner I form the rugæ, and the rim of the plate as well, by pressing short lengths of the string into the wax base-plate in imitation of the natural prominences. The size of the string forming the gum-festoons and rugæ is

FIG. 1.

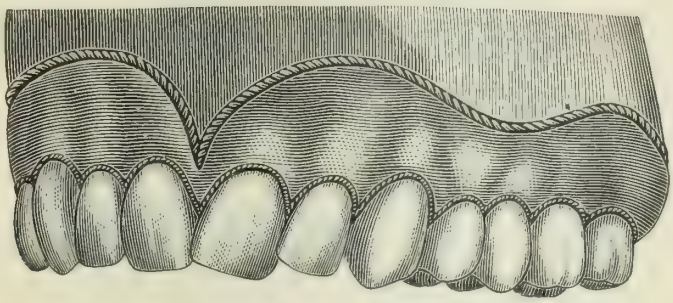
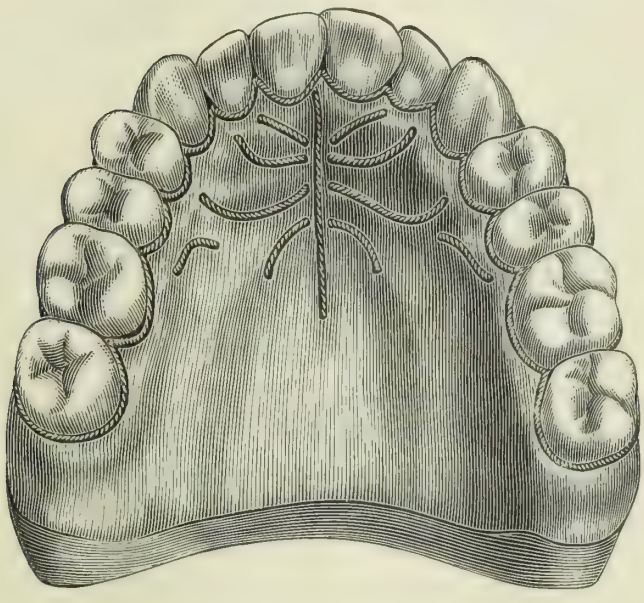


FIG. 2.



about No. 20 of the standard American gauge; for the rim about No. 15. Fig. 1 shows the labial aspect of a case (temperament, nervo-sanguine) waxed and ready for investing in the lower half of the flask; Fig. 2 a linguo-palatal view of the same.

Having the case now articulated, waxed, carved, and festooned, and the rugæ and rim formed, it is to be smoothed with a fine blow-pipe flame, held under cold water a moment to chill the wax and soak the model, and invested in the shallow half of the flask, making the line of division of the two halves come at the rim of the plate.

After the investment has hardened, a strip of No. 3 tin-foil is lightly pressed against the labial wax and faces of the teeth with a ball of cotton, and trimmed about the necks of the teeth with

a sharp lancet or knife-blade, removed, flattened, and laid upon a piece of heavy foil (I use No. 30), and the pattern marked out with a pointed instrument, cut out with a pair of shears, and a number of slits, extending about half way through it, made from its lower edge, to prevent folding or crimpling of the foil when it is pressed and burnished into position. After adjusting it to place,—the foil having been warmed to facilitate that operation,—it is lightly indented over its entire surface with a small plugger-point in the engine-mallet, the mallet being set to make a very light blow.

On the linguo-palatal surface I use a sheet of No. 3 foil, and trim it about the necks of the teeth after pressing to place.

When the case is ready to pack the flask is heated in boiling water until it is certain the wax is softened sufficiently to offer not the slightest resistance to the separation of the two halves of the flask, when it is removed, separated, and as much as possible of the soft wax picked and wiped out, the remainder being washed out with a stream of boiling water. The teeth and foil are now freed from water with bibulous paper and the air-bulb, and finally washed with alcohol and dried before the packing of the rubber is commenced.

I use red or black rubber for the palatal surface and countersinks, which latter should, in packing, be very carefully filled with small pieces, and I form the labial and linguo-palatal surfaces of the Walker "granular gum" facing.

Of course, a considerable surplus of rubber should always be avoided, but it is particularly necessary to beware of a large excess when using the "granular gum" facing, because when that excess is squeezed out through the vents the particles on which the granular appearance depends will be elongated and the imitation of the natural gum lessened. I ascertain when I have the proper quantity of rubber by pressing the two halves of the flask together, and do so without tearing the thin foil covering of the model by painting it with liquid soap, the soap being washed away before the flask is bolted. The rubber is vulcanized at a temperature of 310° F.; time, one hour and a half.

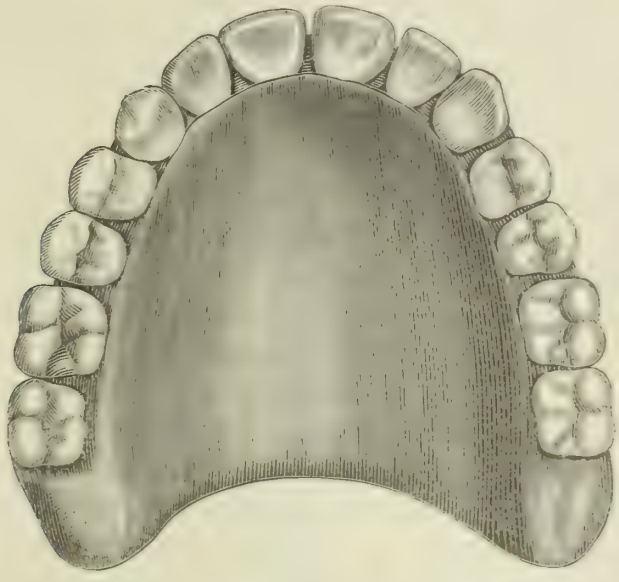
The finishing of this denture is very simple. After the flask is cooled until there is no warmth left in the plaster investment, the plate is removed and washed, the heavy tin-foil covering the labial and buccal gums pulled off, and the thin foil removed by immersion in dilute nitric acid, when it is ready, after washing off the acid and drying, to have the slight excess of rubber removed, the gum-festoons trimmed with sharp chisels, and finally polished with a stiff brush-wheel charged with powdered pumice. Comparison of Figs. 1 and 2 with Fig. 3, a typical upper denture of the average prosthetist, will show the advantage of some of the points I am trying to make better than I can tell them. In making lower dentures the "granular gum" is placed on the lingual as well as labial and buccal surfaces.

Concerning the subject of strength there can be no question. The countersunk-pin teeth are supported not alone by pins, but

also by the walls of vulcanite around the necks and that filling the countersinks.

Another distinct advantage which the countersunk-pin teeth have over the sectional block and plain teeth is, the anterior and posterior teeth are made in different molds, so it is very easy to select molars and bicuspids large enough to make the denture

FIG. 3.



which they go to form, a masticatory apparatus in fact as well as in intention. But the manufacturers can, if they will, still further improve these admirable teeth—improve them as imitators of the natural organs—by making the cuspids about two shades darker than the other members of the set; then we shall have a tooth which ought to be, and which will be, a joy to the dental artist.

PRINCIPLES OF FORCE AND ANCHORAGE IN THE MOVEMENT OF TEETH.

BY C. S. CASE, D.D.S., M.D., CHICAGO, ILL.

IF there is one thing more important than another in the science of regulating teeth, it is a mind that is well trained in the simple laws of physics, with the ability to practically apply these laws to the invention, construction, and management of regulating appliances.

In the voluminous literature and teachings upon the subject of orthodontia and dentistry in general, there is little to be learned of these most important basic principles. In our endeavor to become a great profession and completely disassociate ourselves as professional men from the fearful calamity of being classed as tradesmen and mechanics, there has been an unfortunate tendency to underrate the value of certain branches of knowledge that lie at the very foundation of dentistry, and which should form the only true basis to scientific training for almost everything we undertake as dentists.

In contradistinction to the course commonly pursued by most teachers in the department of orthodontia, I occupy no time in lengthy histories of cases in practice, whose specific procedures and final results seem to be for the purpose of proving the utility of the methods and implements employed, because I believe it to be far more important to train the minds of students: First, in certain broad and general principles relative to artistic and harmonious relations that will apply to all cases; second, how to scientifically apply force for every variety of movement of a tooth in any position, which will equip him, from a mechanical standpoint, for the movement of teeth, and, finally, for the complete management of the most difficult cases of irregularity.

Certainly this is the only true and scientific foundation for that display of individual thought and ingenuity which almost every case commands. He is now, if ever, able to invent something that will be applicable to the particular case in hand, and which may differ in certain particulars from anything that has ever been used or ever can be used again. Furthermore, if correct artistic, physiological, and mechanical principles are employed for the regulation of teeth, results are quite as reliable as most things in exact sciences, and therefore teaching along this line does not necessarily require to be founded on the experiences of practice.

In my teaching I dwell at considerable length upon the laws which govern the activities of force and the mechanical advantages of different methods of applying it in the practical movement of teeth.

I treat a regulating apparatus, together with the teeth to which it is attached, as a machine. The best definition of a machine is that it is an instrument interposed between a moving power and a resistance or work, with the view of changing the direction of force or otherwise modifying it.

The important difference between an ordinary and a regulating machine is, with the former, *power* and *work* are the only important factors. A manufacturer or person engaged in the use of machinery is interested as to how much wood or coal, through the medium of its product, steam or electricity, will produce a certain result in the form of work. Means for taking care of the force of reaction is amply provided for in the substructure or the inertia of the machine itself; whereas with a dental regulating machine power supplied by the operation counts for naught, while the factor, reaction, or fulcrum and anchorage, referred to in Newton's Third Law of Force, is of the most vital importance. This law is: To every action there is an equal and contrary reaction. And this equal and contrary force of reaction, which of necessity is sustained by other vital tissues, should be neutralized, either by reciprocatory action upon other irregular teeth that require movement in an opposite direction, or by so distributing this force through the medium of a static anchorage that it will do the least harm to teeth in proper position.

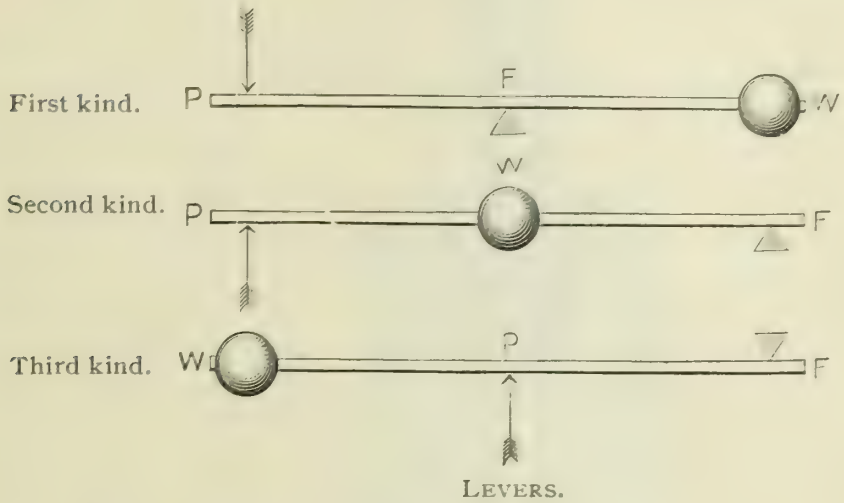
I said that I considered the teeth grasped by a regulating apparatus as a part of the machine itself,—as levers, if you please,

doing work principally upon the bony structure surrounding their roots.

The ordinary lever is a rigid bar or inflexible rod resting upon a fixed prop called the fulcrum, and having power and weight disposed at some two other points. The different ways in which the three factors, power, weight, and fulcrum, can be disposed gives rise to three kinds of levers. (See Fig. 1.)

Here again, as with machines in general, physics in computing quantities deals only with power and weight or work, exemplified in the one general law of levers,—*i.e.*, "Power and weight are in the inverse ratios to their distance from the fulcrum." Nothing is said of the force of reaction or the force sustained at the fulcrum; whereas, with a tooth considered as a lever, the action at fulcrum, as will be shown, is quite as important to us as at the points known as power and weight; and, moreover, it is important to keep in mind approximately the relation which it bears to these factors.

FIG. 1.



LEVERS.

While it is never possible or necessary to accurately calculate these quantities, still, in order to arrive at the rough estimate desirable, a clear conception of the mathematical methods employed under the laws of physics, especially those relating to levers, is very important. This can easily be approximated with levers when we remember that the force exerted or sustained by the factor situated between the other two, at equilibrium, is equal to the sum of the other two, be it power, weight, or fulcrum. That is why a lever of the second kind is always chosen where great force is required at the expense of motion.

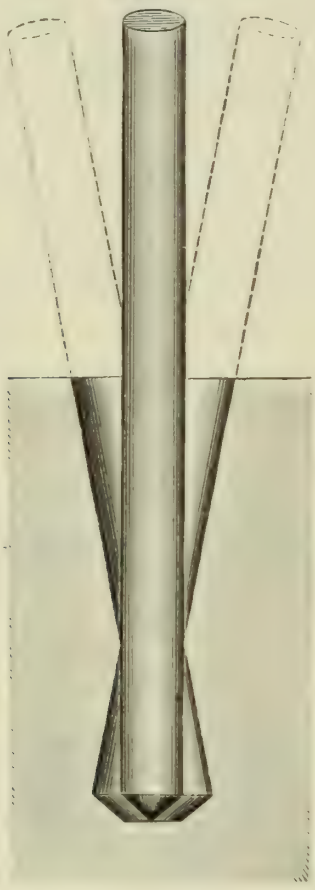
Again, in the typical lever the fulcrum is always considered a fixed point, but we are aware that there are a number of implements employed in mechanics that exert force according to the principles of levers, though in construction they differ in certain particulars from every one of the three kinds. Common examples of this are all forms of the "pulley, and the wheel and axle powers."

There is, furthermore, a not uncommon kind of lever in which points of weight and fulcrum, in their activities upon each other, are more or less interchangeable; both acting as a fulcrum for the

other, with varying stability and relative energy governed by the velocity of the moving power and the relative length of the power arm.

An example of a lever of this kind is an oar of a row-boat. In proportion to the velocity of the moving power exerted by the rower, above the possibilities of the water to get out of the way of the blade, the oar becomes a lever of the second kind and the boat or work moves forward. But if the velocity of the moving power is not sufficient to overcome the inertia of the boat, the only work that the oar or lever can be said to accomplish is the movement of the yielding water in front of the blade, with fulcrum at the oar-lock,—or the action of a lever of the first kind.

FIG. 2.

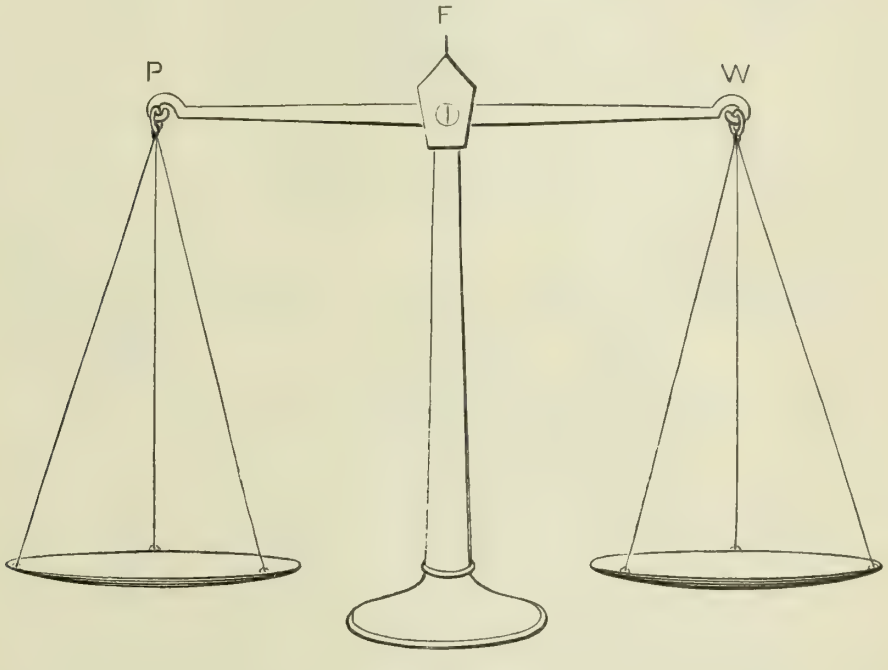


If at any time you should drive a four-foot post one-half its length into clayey soil of uniform quality, and then take hold of the top of the post and move it back and forth with a view of pulling it out of the ground, you would be working a lever which combines the qualities of the first and second kinds, or one like the oar in which the so-called areas of fulcrum and weight act as fulcrums to the other. (See Fig. 2.) After pulling the post out of the ground, if it were possible for you to make a transverse section of the soil for the purpose of examining the shape of the hole you had made, you would find the upper two-thirds a V-shaped opening tapered down to the diameter of the post, the lower third spreading out to an inverted V. Please bear in mind and do not lose sight of the fact that the object of this study of levers is to obtain a clear conception of the relations of the *three*

forces, and principally the relation between the forces extended at points or areas of *f* and *w*, that we may be able to determine more accurately the probable force exerted at the cervical and apical portions of a tooth, with power applied at different points upon the crown. As the post was forced in one direction the soil in front of it along the surface area would become impacted or thrust to one side, the whole acting as a lever of the second kind with fulcrum at the lower end. At some point along its length, however, it would cease to move in the direction of the applied power, the very resistance of the soil over the surface area of work causing it in turn to act as a fulcrum and the whole as a lever of the first kind, with work or movement at the lower end in the opposite direction.

The reason that the upper area of work is twice that of the lower may be found in an examination of laws which refer to the relation

Fig. 3.



of the three factors of levers. Considered as a lever of the first kind, if the fulcrum or surface area of the ground is exactly in the center of the post, the force exerted upon it would be equal to the sum of power and weight, or twice as great as that exerted at the lower end or area of work. Again, when considered as a lever of the second kind, weight or work now being between and at an equal distance from power and fulcrum, it would be forced to receive a pressure equal to the sum of power and fulcrum, or twice as great as that exerted at the lower end or fulcrum area.

I am in the habit of illustrating these important principles to my students by examples of some simple forms of levers of the first and second kinds. (See Fig. 3.) The beam of balance scales is a lever of the first kind. The support or central standard is the fulcrum, with points of power and weight at the end attachments for the pans. It can now be seen at once that when the beam or lever is at equilibrium the fulcrum sustains the sum of

power and weight, and this would hold true of any lever of the first kind at whatever intermediate point between power and weight the fulcrum is placed. When the fulcrum is exactly in the middle of the lever, as with the example of the post lever, the fulcrum receives twice as much force as is exerted at weight, and consequently the post would move through the soil at the surface of the ground twice as far as at the lower end in the opposite direction.

An example of a lever of the second kind may be a rod or pole supporting a weight carried by two men. (See Fig. 4.) If the points at which the two men—whom we may call P and W—

Fig. 4.

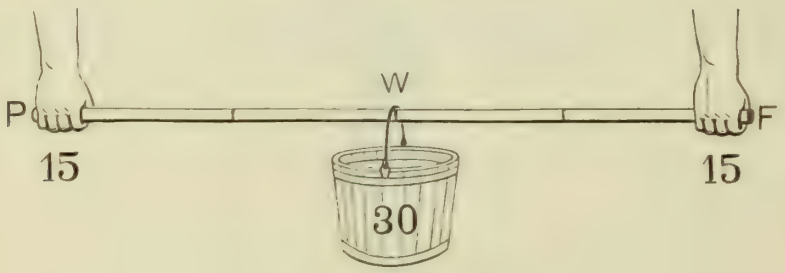


Fig. 5.

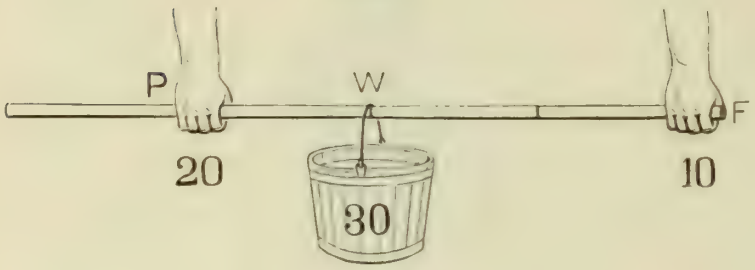
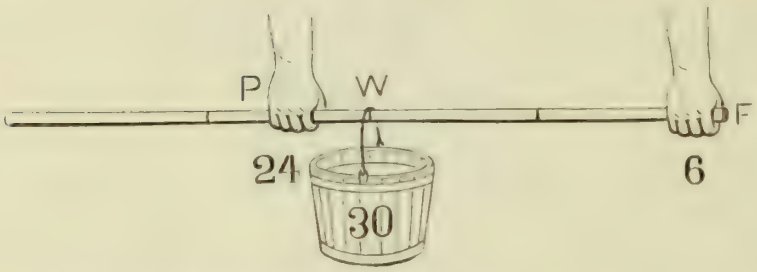


Fig. 6.



grasp the pole are four feet apart, and the weight is a pail of water weighing thirty pounds swung in the center of the pole, each man would exert a force equal to fifteen pounds. In other words, the force exerted at weight exactly in the middle of a lever of the second kind at equilibrium would be twice that at the fulcrum. Here again we have the same result as that shown by the action of a lever of the first kind.

Now, if you please, note the change in the relative magnitude of force exerted at fulcrum and weight when the length of the power arm is shortened. (See Fig. 5.) If P grasps the rod one foot from the pail, we have a three-foot lever with P exerting twice as much force as F, which may be proven by the rule of levers,—*i.e.*,

"Power and weight are in the inverse ratio to their distance from fulcrum."

Power arm of the above lever—three feet—is to W arm,—two feet,—as weight—thirty pounds—is to P, or twenty pounds which leaves ten pounds to be sustained by F. Therefore, the force exerted at weight in this lever is three times that at the fulcrum.

Again, if P grasps the rod six inches from the weight he exerts a force equal to four times that of F, determined by the same law. (See Fig. 6.) Here the force exerted at weight is five times that at the fulcrum.

When we apply these rules to our post-lever (which I have chosen to illustrate on a large scale the action of the same character of force applied to a tooth) we can see that the inverted V-shaped opening caused by the lower end of the post moving in the opposite direction from the applied power may be changed quite decidedly in area by applying the power at different points along that portion of the post above the surface. For instance, when power is applied at the top of a four-foot post imbedded one-half its length in the ground, the movement at the lower end in the opposite direction will be one-half that at the surface of the ground in the direction of the power. When power is applied one foot from the ground, or at a point one-half the length of the exposed end, the movement at the lower end in the opposite direction will be one-third that at the surface, and when applied six inches from the ground (or as near to the alveolar margin of a tooth as the gum will permit) the movement at the lower end will be one-fifth that at the surface.

While teeth differ in shape from each other and from the post-lever I have described, and while their alveolar surroundings do not present a uniformity of resistance to their movement, and therefore while we cannot calculate force and motion with mathematical accuracy, still the fact that they are imbedded one-half their length in a yielding substance and subject to the frequent application of force for the correction of irregularities, the only way by which we can approach an exact science in the application of power for their movement is to consider them as levers propelled by a machine doing work on the tissues in which they are imbedded.

When power is applied at one point to the crown of a tooth at right angles to its long axis, it becomes a lever with combined qualities of the first and second kinds. It is one more than the other in proportion to the relative difference in the resistance between cervical and apical portions. And while the relative proportion of movement at these points will be governed largely by the stability of their bony surroundings, it may be influenced considerably, as with the post-lever, by the position upon the crown at which power is applied. For instance, in the construction of an appliance for the retrusion or retraction of the incisors with a traction wire extending from molar anchorages, if we wish the least movement possible of the roots in the opposite direction, the wire should rest upon the incisors as near to the gingival margins as the

gums will permit. I usually solder to the bands upright bars which extend to the highest points of the exposed faces of the crowns. Grooves or rests are cut at the upper ends of these for the wire, enabling it to span the interproximate gingivæ. (See Figs. 7 and 8.) I frequently extend these bars above the gum-margins, as shown in Fig. 9, in order to apply power that is equivalent to direct force upon the roots at points above the margins of the alveoli, and I wish to say that I find these procedures of the greatest importance in arriving at results for which they are designed.

It is not necessary for me at this time to multiply descriptions of methods relative to other teeth and conditions where this important principle may be employed, further than to say that whenever it is desired to avoid producing an abnormal inclination of the

FIG. 7.



FIG. 8.

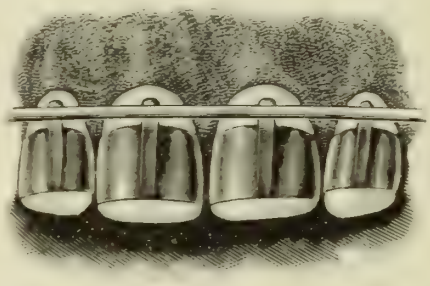
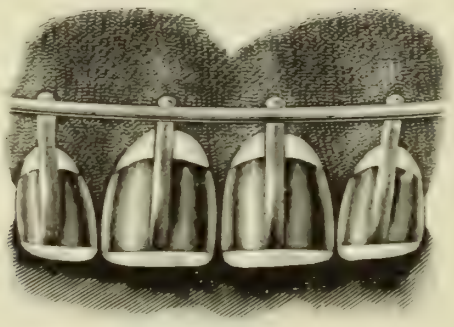


FIG. 9.



FIG. 10.



crowns of teeth in the direction of the applied power, it is important, and nearly always possible, to take advantage of this or some other equally effective mechanical principle.

On the other hand, whenever in the movement of a crown under the application of a single force it is desired to move the root in the opposite direction, the force should be applied as near as possible to the occluding border. This is especially applicable in those very common cases of protruded crowns of the upper incisors, with a retrusion of the roots, the teeth often assuming a decided labial inclination with the production of a depression along the upper portion of the upper lip.

A tooth becomes a lever of the third kind when the power is applied at or near the cervix with the establishment of a mechanical fulcrum near the occlusal portion of crown, forcing work or movement of the entire root in the direction of the applied power. (See Fig. 10, model contour appliance.) This is one of the most impor-

tant and practical principles in dental and facial orthopedia, and one, moreover, to which I am indebted for nearly everything I have accomplished in the development of esthetic facial contours. Instances where this principle may be used to advantage are almost limitless, either in the form of two forces exerting a regulated power in opposite directions for the purpose of tipping the root in its socket, or as power restrained by an independent fulcrum with the view of moving the entire root in one direction.

In a paper presented at the Tri-State Dental Meeting at Detroit, in 1895, I gave the following explanation:

"The limited area upon which force can be applied to a tooth compared to that portion covered by the gum and imbedded in a bony socket has made it next to impossible, with all ordinary methods, to move the apex of the root in the direction of the applied power; nor could this ever be accomplished with force exerted in the usual way at one point upon the crown, however near the margin of the gums it be applied, for the opposing margin of the alveolar socket must receive the magnitude of this direct force,

FIG. 11.

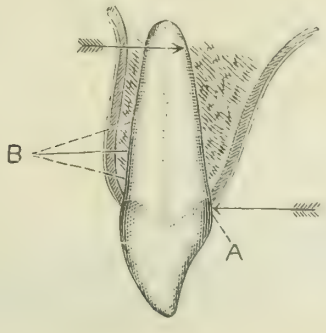
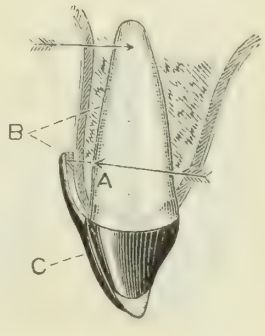


FIG. 12.



and in proportion to its resistance it will become a fulcrum, exerting a tendency to move the apical end of the root in the opposite direction.

"But if in the construction of the apparatus a static fulcrum is created independent of the alveolar process at a point near the occluding portion of the crown, while the power is applied at a point as far upon the root as the mechanical and other opportunities of the case will permit, the apparatus becomes a lever of the third kind, the power being directed to a movement of the entire root in the direction of the applied force."

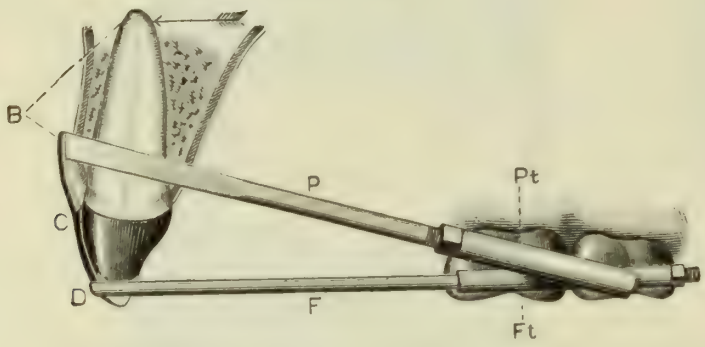
This proposition is made plain by reference to the diagrams. In Fig. 11 let A be a point upon a central incisor at which force is applied in the direction indicated by the arrow, then will the opposing wall B of the alveolar socket near its margin receive nearly all of the direct force; and in proportion to its resistance will there be a tendency to move the root in the opposite direction. This proposition will also hold good even if we apply the force at A, Fig. 12, or as far upon the root as may be permitted by attaching a rigid upright bar, C, to the anterior surface of the crown, the only difference being that we distribute the direct force over a greater area. But if, as in Fig. 13, we attach to the lower end

of C a traction wire or fulcrum bar F, and further enforce the mechanical principles of our machine by uniting its posterior attachment to the anchorage of the power bar P, we will have neutralized our anchorage force materially and created an independent static fulcrum at D. Our apparatus now will distribute its force over the entire root, and give us complete direction and control of whatever power we put into it. The entire tooth can be carried forward bodily, or either end can be made to move the more rapidly. The force thus directed to the ends of the roots will have an increased tendency to move the more or less yielding and cartilaginous bone in which they are imbedded.

An apparatus for moving the roots of the anterior teeth in a posterior direction is constructed quite similarly, the direction of the two forces being reversed.

In that branch of my teaching, entitled "Construction of Regulating Appliances and their Management," I endeavor to arrange the work systematically according to the distinct mechanical principles involved in the scientific application of the required force. I divide the whole subject under this head into two general divi-

FIG. 13.



sions, entitled, respectively, Action and Reaction. Under the head of "action," which pertains exclusively to the movement of malposed teeth by the direct action of force, I take up: First, the movement of crowns in every direction; second, the movement of roots in every direction, with or without the movement of their crowns; third, rotating or turning of teeth on their long axes; fourth, intrusion and extrusion, or the gradual forcing of teeth in or out of their sockets.

The second main division of the work entitled "reaction" pertains to the management of the oppcsing force to action. This I divide into: First, reciprocating or movable anchorages, describing methods for utilizing the force of reaction in the movement of other malposed teeth; and, second, stationary or static anchorage appliances.

I do not mean by this that I confine the teaching of this work to a single branch at a time to the exclusion of all others, but I endeavor to blend them into each other, illustrating the principles, as I progress, with practical cases.

In a single paper of this kind it will be impossible for me to give the special underlying principles for the application of force in all

the branches of this work, but in order to give you an idea of its scope I will, as briefly as possible, describe the principles involved in the construction of static or stationary anchorage appliances.

This branch applies to those cases of irregularities where the force of reaction to the work of regulating must be sustained by tissues which surround teeth that we do not wish to move. As these are usually the posterior teeth, with the power applied to them either in a posterior or anterior direction, I will confine my remarks to that class of anchorages.

If force is applied at one point on the crown of a molar tooth in an anterior direction, the principal fulcrum is a certain area of the anterior wall of the alveolus of the mesial root in the vicinity of the apex. This being the immovable point around which all other parts must rotate in movement, it is often found that the relative shapes of the other root or roots are such that they are lifted almost directly from their sockets, their membranous attachments being the only bar they present to the process of tipping the crown. It would seem that the three roots of the upper molars would enable these teeth to present the greater resistance to this movement, but I have found that they tip quite as easily as the lower molars.

FIG. 14.

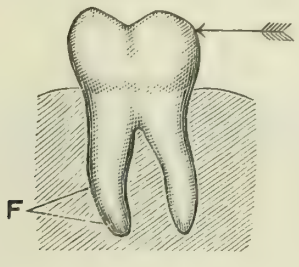


Fig. 14 is a lateral view of a right lower molar. If force is applied to the crown in an anterior direction, at a point at or near the occlusal surface, the probable fulcrum area would be at F, and as the crown moves forward the distal root is found to be lifted from its socket with slight impingement along its walls. If the force is in the posterior direction, the natural curve of the mesial root, which is quite common, would offer still less resistance to the tipping motion of the crown.

In contemplating the construction of a molar anchorage appliance that will permit the least possible movement of the included teeth, the principal object therefore should be to so construct the device that the great tendency to tipping of the crowns will be prevented. If this is fully accomplished and the tooth or teeth are held in an upright position, the applied force will be evenly distributed over the entire anterior or posterior surfaces of the alveoli for all the roots, increasing the stability of the anchorage to an incalculable degree. If the appliance is loosely attached to the teeth, or permits the slightest hinge movement, as would arise from a removable crib or a single uncemented band that encircles two or more teeth, there would be nothing to prevent this tipping tendency, though such an anchorage might be sufficient for many purposes if it is attached to a sufficient number

of teeth and the applied power is always less than their combined natural inertia. But instances frequently arise in the regulation of teeth where it is eminently desirable to obtain an anchorage of the greatest possible stability. When considerable force is required to reduce an irregularity, two or three teeth should be included in the grasp of the anchorage appliance. The addition of a second tooth to the anchorage will not only double its stability, but incalculably increase it, by the support which the two teeth can be made to give to each other by a proper construction of the appliance. In its construction German silver or platinized gold bands should be selected that are six to ten thousandths of an inch in thickness (or Nos. 34 to 30 B. and S. gauge), and as wide as the teeth will permit. When these are soldered and properly contoured to perfectly fit the crowns, take a plaster impression of them in position, after which carefully remove the bands, place them in the impression, and fill with Teague's or any good investing material. This will hold them in proper relative position during the soldering process. Solder should be flowed between the bands, uniting their approximal surfaces and filling the V-shaped spaces on either side. To more perfectly reinforce the stability of the appliance, fit and solder to the lingual surfaces a flattened piece of No. 16 wire; after which the tube or tubes are to be attached for the power bars or traction wires for the movement of the anterior teeth. In attaching the tubes, the advantage of applying the power as near to the gingival margin as possible should be remembered.

When such an appliance is fitted and cemented to the teeth, it will hold them rigidly in its grasp in an upright position. If the bands are thin and narrow, or the apparatus is not sufficiently reinforced by the solder and otherwise, the slight yielding of the material under great strain will allow the teeth to tip and soon break loose from their attachments.

Instances frequently arise where only one tooth can be used for an anchorage on one or both sides of the mouth. These teeth not being supported by adjoining teeth will readily tip, if not properly sustained. In fact, a molar tooth that is allowed to tip will offer but little more resistance to force than a bicuspid, but if sustained in an upright position it will be impossible to force it bodily through the process with any ordinary power. This is especially true of the lower molars, which, when tipped to an anterior or posterior inclination, are readily forced from their imbedment or partially lifted out of their sockets; but if held in an upright position the two broad roots will resist immovably a large amount of force. When a single isolated molar is used for an anchorage attachment the band should be wide and thick, fitted and cemented as carefully as a crown, with rigid attachments for inflexible extensions. However perfect the band and its attachments, if a flexible traction wire is used to transfer the power, no obstruction is offered to the tipping tendency of the molar. The same is true with an inflexible power rod, if the band is thin, narrow, and yielding, or in any way movable upon the tooth, or if the power tube is short and loosely fitted to the rod.

When great immobility of a single anchorage tooth is required, use for banding material German silver or platinized gold, No. 30 gauge, and as wide as the tooth will permit. When these are contoured and fitted, solder the power tube at the gingival margin. (See Fig. 15.) This should be sufficiently long to permit reinforcing it at either end with solder to the full width of the tooth, and large enough to carry a power rod that will be inflexible. Where it is possible, the power tube may rest above the gingival margin, soldered to an extension plate that is fitted or swaged to the surface of the crown and so shaped to freely clear the gum.

If the power tube is extended forward to the first bicuspid and its anterior end allowed to rest upon a narrow projection soldered to the bicuspid band, it will add greatly to the stability of the anchorage.

FIG. 15.

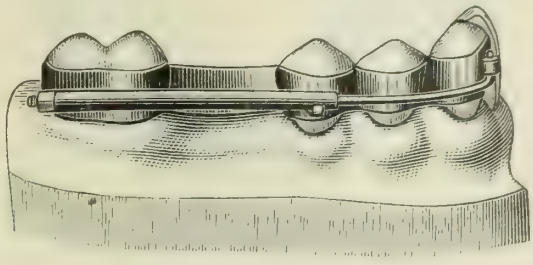
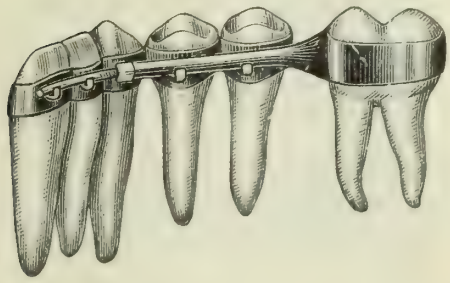


FIG. 16.



It will be seen that any tendency of the molar to tip forward will carry the anterior end of the tube almost directly toward the root of the bicuspid, the movement being prevented by the rest. (See Fig. 16.) Nor will such a device offer any special obstruction to the movement of the bicuspid, the rest sliding along the tube.

It is often more convenient to sustain the anchorage with a flattened bar soldered to the lingual aspect of the molar band which extends to and engages with rests upon the bicuspids. This is especially applicable where it is desired to reduce an anterior protrusion with a small flexible traction wire encircling the teeth. Frequently the lower cuspids are anteriorly prominent, the incisors are crowded, irregular, and somewhat extruded, but not protruded, —in fact, they are frequently retruded, presenting one of those cases where the extraction of a bicuspid is indicated, were it not for the fact tnat the first molar on one or both sides is missing. Here the anchorage for forcing back the cuspids with a buccal bar may be sustained with a tube, instead of a flattened bar, which extends along the lingual aspect of the bicuspids, but not supported upon

rests. An inflexible rod is fitted into these tubes (one on each side), and engages with hooks soldered to the incisor bands. (See Fig. 17.) If the incisors are retruded, the ends of the bar may be threaded for nuts at the anterior ends of the tubes to force the incisors forward, the two forces being reciprocatory. It will be seen that any forward tipping of the molars will be prevented by the incisors sustaining the anchorage support, the force tending to intrude the incisors.

FIG. 17.

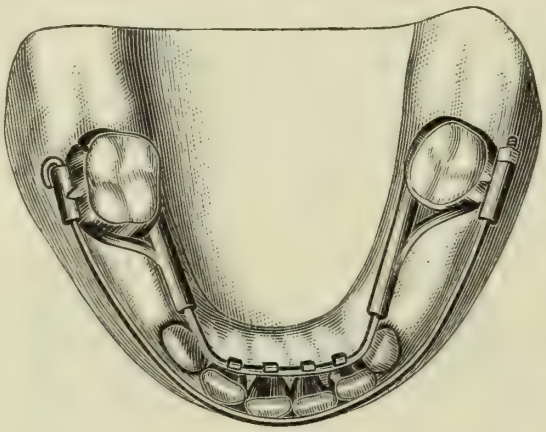
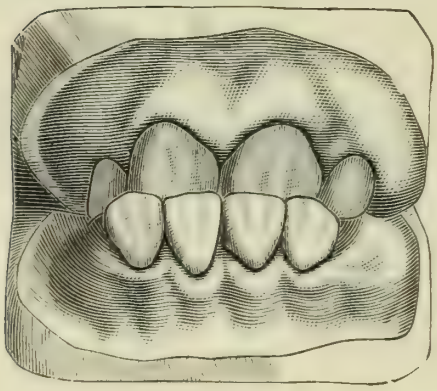


FIG. 18.



A similar device is applicable for children with a decided lower protrusion, where the early extraction of the first bicuspids has been indicated, and with only the immature first molars that can be used for an anchorage to reduce the protrusion. (See Fig. 18.) The lingual supporting tubes should be sufficiently large to allow the ends of the wire that engage with the incisors to easily glide into them as the incisors are forced back with an encircling traction wire.

The same device is also applicable to the upper teeth when the occlusion will permit of its attachment.

CORRESPONDENCE.

"FACULTIES *versus* EXAMINERS."

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In the *Items of Interest* for August, 1897, there appeared an editorial on "Faculties *versus* Examiners."

At the examination held by the New Jersey State Board on July 13, 14, and 15, the editor of that journal says he was present by invitation, and "a careful and critical investigation of the methods of the Board proves most conclusively that it is endeavoring to fulfill its duties righteously."

I was also present at the particular examination of which the editor speaks, not by invitation from the examiners, but as a candidate for examination.

So far as the editor's conclusions are concerned regarding the methods of the Board and its endeavors to be impartial and fulfill its duties righteously I fully agree with him. I think the examination was conducted fairly and in an impartial manner, and I did not find the standard of the examination above that of the college from which I came.

He says, "twenty-nine men applied for examination, of whom twenty-six were graduates. As an evidence of some knowledge of prosthetic dentistry, the candidates were required to bring a full set of teeth, invested ready for soldering, and to solder the teeth to the plate in the presence of the examiner. Not one of these twenty-nine men, twenty-six of whom were graduates, had invested their pieces so that there was any possibility, with the facilities at hand, to properly heat up the invested piece prior to throwing the flame of the blow-pipe upon the solder. In fact, a hot furnace fire would have been requisite. All had from three to ten times as much investment as there should have been. This is not a lack of preliminary education, but an evidence of poor training in the schools."

As a candidate for examination at that time, I care nothing for the statement personally, although I was successful in passing the examination by the Board.

We naturally suppose an editor to be a little guarded in his statements, but do these statements sound reasonable? Not *one* piece was invested so that there was any possibility, with the facilities at hand, to properly heat up the invested piece before pointing the flame! In fact, a hot furnace fire would have been requisite! I make the statement that many were invested so that there was every possibility of heating up, with the facilities at hand, considered from the standpoint of teaching of the chair at the college from which I received my dental training,—and I fully believe the person who occupies that chair to be equally as practical as the editor of *Items of Interest*.

Again he says, "All had from three to ten times as much investment as there should have been." Think of it, and several candidates, to my knowledge, had had practical experience in the laboratories of practical men. Can the profession believe the statement of this editor, twenty-six men coming from recognized colleges and all having not less than three times too much and some as great as *ten* times too much investment? I heard the examiner in prosthetic dentistry say to one candidate that he had only one fault to find with his investment, and that fault was not in the amount of material used, but in the manner of investing.

No doubt many of the investments, including my own, contained more material than was absolutely essential to scientific soldering. But look at the absurd statement of the editor. Such a statement is not in accord with reason, and I believe to be greatly exaggerated and therefore false. Then (I suppose basing his conclusions upon the above statements) he goes on to say that this is not a lack of preliminary education, but an evidence of poor training in the schools.

I think this editor spent most of his time while at the examination in the front room, using a palm-leaf fan during those hottest of hot days, about the middle of July, instead of in the hot, smoky laboratory, where he would have been able to give a just report of the prosthetic work done at the examination.

For the members of the Board I have nothing but the highest regard.

The editor criticises the teaching in this particular branch of probably six or eight recognized colleges.

I would ask where he obtained his criterion,—his standard of comparison by which he judges and condemns the teachings of practical men with such gross statements.

No cause is strengthened by making statements that are not in accord with reason and justice.

Respectfully yours,

ARTHUR E. GUPTILL, D.D.S.

AUGUSTA, Maine.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I note in the October issue of the DENTAL COSMOS, page 790, that Dr. W. E. Walker takes exception to my application of the words "occlusion" and "articulation" in "Catching's Compendium for 1896." As a preliminary, it may be stated that I have used both words in their generally accepted sense,—to wit, the articulation of the teeth is used in its anatomical sense to describe the relationship of contiguous bones which are joined to one another through the medium of modified connective tissues; the articulation of the teeth, therefore, in anatomical parlance, is their relationship with their alveoli. For a long period dentists had applied the same term to also express the contact relationship between the upper and lower teeth, thus having the same word to express two entirely different things. Recognizing the confusion which arose from this double application of one word, the term "occlusion" was suggested and adopted to express the relationship between antagonizing teeth. The application of the word, faulty though it undoubtedly is, both from a philological and an anatomical point of view, is deemed preferable to having one word express two entirely different conditions; the confusion arising out of this would be a greater evil than using a but partially expressive word.

Dr. Broomell, "Proceedings of Pennsylvania State Dental Society," 1896, criticises the lack of full expressiveness of the word "occlusion," and suggests that the word "articulation" be used

to indicate the contact relationships of opposing teeth in the process of mastication, a return to old nomenclature. It appears that Dr. Walker has arbitrarily adopted the above sense of the words, and bases his criticism of my phraseology upon that adoption. It needs no argument to show that such a course is entirely inadmissible and highly illogical in the gentle art and science of criticism. Upon such a basis of criticism even the "Universal Law of Gravitation" might be found full of flaws. Dr. Walker stigmatizes my application of these words—an application based upon the almost universal acceptance of the meanings of the words—as carelessness, misuse, and productive of gross error. This is, to put it mildly, strong language to express failure to adopt new applications of words, which, so far as I know, have not been accepted by anyone but Dr. Walker.

If the suggestion is permissible, I would point out that it would have been more rational for Dr. Walker to have translated my phrases into his own language rather than to explosively find fault with dental nomenclature over my shoulder. The course is, at least, intemperate and ill-considered.

In regard to the criticism relative to the note in the "American Text-Book of Prosthetic Dentistry," it is easily explicable. When models of a perfect denture are mounted in a Bonwill articulator, it will be seen that the plane of the articulator joint and the plane of occlusion are parallel; but when the lower model is advanced until the tips of the opposing incisors are in contact, the joint arm of the articulator moves from the horizontal, forming an angle of from 5° to 15° with the horizontal, the extent of the divergence being governed by the depth of the incisor overbite. Dr. Walker has pointed out the insufficiency of this angle, finding, by measurements, that its average is about 35°, in some cases as low as 5°, in others as high as 40° or more, when measured upon the human jaw itself. It is not necessary here to enter into a detailed description of Dr. Walker's important discoveries, except to say that he has pointed out the flaws of the Bonwill articulator as a *scientific* instrument, and has constructed an apparatus which does reproduce all of the mandibular movements in their many variations, furnishing an instrument which demonstrates the truth and accuracy of his observations relative to mandibular movements.

While recognizing the truth and value of this, we cannot be blind, nor should not undervalue the great worth of Bonwill's labors relative to the mechanism and physiology of human occlusion. Nor must we ignore that ten years ago M. H. Cryer, "American System of Dentistry," vol. i, page 112, *et seq.*, pointed out the nature, character, and scope of all of the mandibular movements. Be it understood, though, that Dr. Walker first recorded their variations.

Bonwill, during thirty years or more, has expounded at length the relationship between overbite and cusp length, between overbite and variations in the occlusal plane, of the lack of parallelism between the two halves of this plane, together with the actual

mechanism of mastication in all of its phases. While I, as many others, have failed to agree with Bonwill as to the occult significance attaching to the constancy of the equilateral triangle, and have failed to find in his work and discoveries anything which can disturb the stability of the "laws of organic evolution," yet the importance of his work to the practice of dentistry is as patent as it should be freely acknowledged.

Bonwill's discoveries and teachings must rank as of transcendent importance; they are, so far as their practical applications to dental mechanics and pathology are concerned, second to no others. His right and title—the discoverer of the mechanics of mastication—are indubitable and permanent.

When the time comes that Bonwill's work in this direction is presented as a clear exposition of applied anatomy, and the effects of anatomical variations upon dental nutrition are set forth as Bonwill sets them forth in conversation, but unfortunately not in his writings, future generations of dentists will accord him the honor which is his just due. It is needless to say that in the summing up Dr. Walker will also receive his quota of credit for his supplementary work.

HENRY H. BURCHARD.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—It will be of interest to the profession at large to note the recent strictness of the laws relating to foreigners practicing dentistry in Italy. October 22 the Minister of the Interior sent to all the prefects in Italy, demanding that all foreigners practicing dentistry in their respective districts, and not having the Italian medical degree, should be forbidden to continue practice, under penalty of law.

The following, an extract from a daily paper, explains the situation:

"The sanitary law forbids the practicing of a profession to those who, being furnished with diplomas of foreign origin, have not obtained the corresponding title from the Italian universities and schools. From that restriction are excepted the surgeons and physicians possessing foreign diplomas who are called expressly or who practice only among foreigners. Naturally, no one can profit from this exception who is not a surgeon and physician. Therefore, all foreign dentists practicing in Italy without having had their title legalized by obtaining a corresponding degree of Italian origin necessarily find themselves violating the sanitary law. The Ministry, now wishing this abuse to cease, and with the double object of preventing eventual harm to the public safety, or, in any case, to cause the law to be respected, and to guard, as far as possible, the interests of the Italian physicians against the illegitimate competition of the foreigners, has determined to call the attention of the prefects to the subject, that they may make the necessary examination of the titles of those now practicing in their respective districts, inviting those who are found practicing illegally, as above stated, to cease the practice of the same, under the menace of legal prosecution."

As the laws heretofore in force permitted anyone holding a diploma from a reputable school to establish himself in practice among the foreigners, this change works great injustice to those

who have been in practice many years, and especially to those who have invested money in acquiring a clientele. There are about twelve American dentists practicing in the kingdom, and this law is, of course, aimed at them, as they occupy a higher position, socially and professionally, than do the native dentists.

As about fifty thousand Americans visit Italy annually, and the foreigners expend more than forty million dollars annually in the country for travel and pleasure, it would seem but right that they have competent men to attend them when in need of dental service.

Very truly yours,

"AMERICUS."

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I would like to hear from the profession regarding a peculiar disease affecting the entire lower maxilla which came under my observation recently. The subject was a married lady, about thirty years of age, in good health, medium size, weight about one hundred and fifty pounds. Before she came to me she had two lower bicuspids extracted, because they were very badly decayed and had been causing her considerable pain. The cuspid adjacent to the two bicuspids which had been extracted prior to her visit to myself also ached, and she came to consult me. I examined the gum, and found that the sockets had healed very nicely. There was no sign of necrosis then, but the gum around the lower cuspid was inflamed and sore to the touch. The cuspid was sound and had no decay. I prescribed a mouth-wash, and advised her to report to me in two or three days. When she visited me again I found the tooth raised from the socket and loose. I then lanced the gum, but, as there was no relief, I decided to take out the tooth. The extraction only gave temporary relief. She came to me again in a few days, and I found the lateral incisor in the same sore and loose condition, and I then advised her to consult a specialist or her family physician. She was under the latter's treatment for three or four months, but experienced no relief from the painful condition of her gums. According to his advice, I extracted the remainder of her teeth at intervals of a week or ten days. The gums were puffed, and there was no pus, but congested blood, in the sockets. The extractions did not better her condition, and finally the surgeons cut away the entire lower process and a portion of the jaw. This operation has disfigured her for life. Ten days after the patient had the two lower bicuspids extracted she stated that while she was riding a bicycle she collided with a carriage and was thrown violently to the ground. Would such an injury produce the extensive inflammation and subsequent loss of process of the lower jaw? The surgeon pronounced the disease "necrosis." Could it not have been arrested by them before it involved the entire lower jaw? The loss of blood, anxiety, and pain emaciated her considerably, and she now weighs less than one hundred pounds. The family physician charges that the necrosis was the result of the faulty extraction of the two lower bicuspids and the incompetency

of the operator. I would like to hear from some members of the profession whether they, in their practice, observed a case similar to this; also, what opinion they might entertain on the subject.

Respectfully yours, "X. Y. Z."

Publications Wanted

Following is a list of American dental transactions desired to complete the Library of the Surgeon-General's Office, Washington, D. C.:

Alabama Dental Association. Want all publications.

American Dental Association, Transactions. Want 1863.

California State Dental Association, Transactions. Want fifth, 1874; eleventh, 1880, and all subsequent.

Central Dental Association of Northern New Jersey. Want all publications.

Central Illinois Dental Society. Want all publications.

Central Pennsylvania Dental Association. Want all publications.

Chicago Dental Society. Want all publications

Cincinnati Dental Society. Want all publications.

Delaware State Dental Society. Want all publications.

Dental Society of the State of Maryland and the District of Columbia, Proceedings. Want all except first annual session, 1875.

Dentist Mutual Benefit Association. Want all publications.

Harris Dental Association. Want all publications.

Illinois State Dental Society, Annual Journal of. Want fifteenth, 1879.

Iowa State Dental Society, Transactions. Want all except joint session, 1873, and eighteenth, 1880.

Kansas City Dental Society. Want all publications.

Kansas State Dental Association, Transactions. Want first, 1872; sixth to ninth, 1877–80; twelfth, 1883, and subsequent.

Kentucky State Dental Association. Want all publications.

Lake Erie Dental Association. Want all publications.

Lebanon Valley Dental Association. Want all publications.

Louisiana State Dental Society. Want all publications.

Michigan Dental Association, Transactions. Want first to twenty-first; twenty-third, 1878; twenty-seventh, 1882, and subsequent.

Minnesota Dental Association. Want all publications.

Mississippi Valley Association of Dental Surgery, Proceedings. Want all except first annual meeting, 1845.

Nashville Dental Association. Want all publications.

National Dental Association. Want all publications.

Nebraska State Dental Society. Want all publications.

New Jersey State Dental Society, Proceedings. Want all prior to 1870; 1889, and subsequent.

New Orleans Odontological Society. Want all publications.

New York Odontological Society, Transactions. Want all prior to 1875; 1878, 1884, 1888, and subsequent.

North Carolina State Dental Society. Want all publications.

Northern Ohio Dental Association. Want all publications.

Northwestern Dental Association. Want all publications.

Odontographic Society of Pennsylvania. Want all publications except Vol. I, for 1864.

Ohio Dental College Association. Want all publications.

Ohio State Dental Society, Transactions. Want first to ninth (all prior to 1875); nineteenth, 1884, and subsequent.

Oregon State Dental Society. Want all publications.

Pennsylvania State Dental Society, Transactions. Want seventh annual meeting, 1875; also, 1884, 1885, 1887, 1893, and subsequent.

Pittsburg Dental Society. Want all publications.

Rochester Dental Club. Want all publications.

Seventh District Dental Society of New York. Want all publications.

Sixth District Dental Society of New York. Want all publications.

Southern Dental Association, Transactions. Want all except third meeting, 1871.

Tennessee Dental Association. Want al publications.

Texas State Dental Association. Want all publications.

Third District Dental Society of New York. Want all publications.

Virginia State Dental Association. Want all publications.

Washington, D. C., Dental Society. Want all publications.

Wisconsin State Dental Society, Proceedings. Want all except for year 1871.

It is probable that several of the state societies here mentioned have published no proceedings other than in the current dental journals. Definite information about such cases is much desired.

J. C. Merrill,
Major and Surgeon-General, U. S. Army Librarian, S. G. O.

To the Editor of the Dental Cosmos:

Sir,—In looking over the statistics of dental schools in the United States, as shown in the pamphlet lately issued by the United States Bureau of Education, at Washington, on "Professional Education," one cannot but be impressed with the rapid increase in the number of dental students, and the question at once arises, How can we account for such a rapid increase? Theological students seem to have increased in a normal way, medical and pharmaceutical students more rapidly, law students still more rapidly, but dental students surpass them all. And this notwithstanding the fact that all dental schools now require attendance for three years instead of two, as formerly. One can understand why young men leave the long courses of three and four years in medicine, costing from $300 to $800 in fees alone, or from $600 to $3000 for all expenses, and take up law, which they can com-

plete in most of the states in one or two years, simply by study in the evenings and at home. But lengthening the course in dentistry does not seem to drive away students from it, or, if the increase is partly due to each student being counted for three years instead of two, he acquires a much better training in that length of time, and will, therefore, be more apt to stick to his profession.

Can the large increase of professional students be attributable to the great development of public and high schools, which are educating large numbers of young men who turn their backs to plows and shops and seek the greater dignity of professional life,—a laudable ambition, if backed by ample natural and educational ability,—or are the people becoming more appreciative of the great benefits of successful dentistry, both as regards personal appearance and health of the body?

Here are some of the statistics from 1870 to the present time:

Students.	1870.	1875.	1880.	1885.	1890.	1895.	1897.
Theological	3,254	5,234	5,242	5,775	7,013	8,050	....
Law	1,653	2,677	3,134	2,744	4,518	8,950	10,449
Medicine	6,194	8,580	11,929	11,059	16,660	22,887	....
Dentistry	257	469	730	1,116	2,696	5,347	6,460
Pharmacy	512	922	1,347	1,746	2,871	3,859	3,426

It will be seen that the percentage of increase in the number of dental students is far greater than in any of the other professions. This proves the wisdom of the requirement of a three years' course, and may even suggest the lengthening of the term to eight or nine months each year, instead of five or six.

A. Erskine Miller.

Washington, D. C.

PROCEEDINGS OF SOCIETIES.

Southern Dental Association.

(Continued from page 858.)

First Day—*Evening Session.*

Discussion of Dr. John S. Marshall's paper, entitled "Does the Present Method of Teaching by Didactic Lectures Best Qualify the Student for the Practice of his Profession?"*

Dr. J. Taft, Cincinnati. The method of teaching in our dental colleges is undergoing a change, as in other institutions. Improved methods of instruction are being introduced, from the kindergarten to the universities. Is there any reason why the dental colleges should not make similar changes, with a view to their betterment, to making them more efficient? When an opportunity for improvement offers it should be recognized, if we would keep up with the times and in line with the progress made in other directions. If advances are made along other lines, it is

*Dr. Marshall's paper is published at page 760, September issue, Dental Cosmos.

equally important that we should make changes also where they can be made for the better. Those among us who can look back forty or fifty years will recognize that our methods were very primitive—elementary—then. Others can hardly conceive of the change that has been wrought. A special point is that the person seeking to enter our profession shall be thoroughly prepared to do so. In entering upon any line of life certain qualifications are demanded. This rule has not been enforced in our profession as it should have been. Unfortunately the demand has been for the largest number in the classes, regardless of fitness or preliminary training. Great improvement along this line is being made now; more discrimination is being exercised. It has come to be recognized that to make available any line of special education the general education must be as thorough as possible. In some portions of our country a large percentage of the young men are well educated. Grammar schools and high schools are easily accessible. But in other parts of the country opportunities for a good education are more limited; the young men are denied many privileges and opportunities common in other communities. But there is a general awakening; opportunities are increasing; the people are waking up to the realization of the necessity of preliminary education as essential to success in any line of life. It is rare now to find any one who will admit that he places a low estimate on the value of education. In the dental profession, as much as in law or in medicine, it is admitted that progress is in proportion to preparation. In dentistry it is not only finger-craft—manipulative ability—that is needed, but there must be an inculcation of principles, or the best results will not be brought forth. The paper read discusses methods of instruction. The lecture method should not be abandoned altogether. The study of text-books is good in its place, but too much of it is objectionable, as the mind gets into grooves, follows in the line some one else has worked out; there is no incentive to original thought. Text-books are valuable as works of reference, to corroborate or refute; but to limit the student to the task of committing the contents of so many pages, on which he will be examined by questions, is not education in the true sense of the word. To educate is to draw out, to stimulate thought, not to make the student do just as somebody else has done. Laboratory work is necessary, but it must not be allowed to overshadow didactic methods. Each has its place, and the two should be wisely combined. It is a mistake to discredit the lecture system. The voice and the personality of the lecturer contribute elements not to be found in books. Books have no magnetism; they rouse no enthusiasm; they stamp no living impress upon the minds, upon the character of the student. A teacher, as such, should have certain distinct qualifications; he should have had special training for the position he is to occupy. Unfortunately there has been no such requirement for the teachers in our dental colleges. There should be normal schools for training teachers of dentistry and medicine specially for that work. Then we would have men far above those of us who began in such a simple way in years long gone by.

Dr. W. C. Barrett, Buffalo, N. Y. This is a subject that is very near my heart. I was nominally a teacher long before I knew anything to teach. Before I studied for my profession I was a teacher. When I entered the profession I became a teacher; I sought to impart what I had been able to obtain. There is an error, a mistake in our conception of the word "education,"—that it means *to draw out*. How can we draw out what has never been put in? The conception of drawing out by education is a misconception. A teacher—a successful teacher, a good teacher—must be born a teacher; he cannot be manufactured for the position. He must have the power of impressing upon others his individuality, his energy, his ambition. He must be a man of imperative strength of character, able to impress himself upon his students. He must be qualified for his work, thoroughly familiar with his subject. Now what is the best method of teaching? I believe with Dr. Taft that the best way is by didactic lectures for the inculcation of basal principles. To the man who is trained in this method of teaching thoughts come up in regular array; definitions are concise; his work is planned in a regular, systematic course. By the magnetism of his own presence he impresses it upon his students as no book, no pale cold page, no task to be learned can ever do. He must be an earnest man; he must not tell stories, except as they illustrate principles; he must not lower his dignity by mere funny stories, nor undue familiarity. Students will have no respect for your calling if they have no respect for your character. Books are dry; lessons are a task; but the principles inculcated and stamped in by an enthusiastic teacher—one who is competent for his place—will never lose their impress upon the mind and character of the student. We are now in the tentative stage,—a developmental period. We are reaching out and seeking for light. Dr. Taft, who still stands among us, was one of the very first to engage in this work. Systematic dental education dates back no further than our own contemporaries. Dr. Taft, who was one of the first in the work, is still at it. All things require time for growth. You forget the weakness of the teachers; they are but human; they are only practitioners like yourselves. We are doing the best we know how, but we are still in the transition period. Think of the advances that have been made within the compass of your own memory. Look back, say, only twenty-five years ago. The teachers have received no emoluments from their profession. They are so poorly remunerated that they must labor with their hands, day by day, for those dear to them. They are not free from the toil and the cares of daily practice, but I thank God for it, for it keeps me in close touch with those to whom I impart that which I have learned. There is no school of pedagogy for us; it is by daily practice that we must keep pace with the advances that are being made. The dentist occupies high ground; he feels strong rock beneath his feet. The mere pedagogue teaches only; he ceases to advance.

The didactic system is the only system for the present time, when we are teaching that which is changing from week to week,

from day to day, almost from hour to hour; it is not yet crystallized into text-books. The teacher should be the most competent man, but too often the college must take the man it can get, not the best one in existence; they must take the men who are available. We are trying to raise the standard of admission, but just now we have to teach the a, b, c's; we cannot teach the higher branches; we cannot give a classical course, but we aim high and will eventually attain the goal. We will yet be an educated body, a scientific body, rising to still higher flights. God knows, the schools are bad enough, but we are doing the best we can. The stream can rise no higher than the fountain-head, which is its source.

Dr. J. Y. Crawford, Nashville, Tenn. I wish to thank Dr. Marshall for his paper. He writes well, and has made the best argument I have ever heard on the wrong side of the question. I agree with some things that have been said, but there are others that I do not like at all. I like to listen to a man who is capable of telling what little he knows in a way that is pleasing to his audience. Oratory is a force in the councils of the world. Oral teaching is the best method in the world. You can reach men by talking to them as you can in no other way on earth. There are three kinds of men in the dental profession. There is a small, select class of men who can talk very nicely; then there is another small class who can work a little bit, but they can't talk, and then there is a whole lot of men who can neither work well nor talk well.

There are some things about education in this country that need explaining. Dental education is peculiar. A man, to be a good dental surgeon, needs to be a little better educated than for any other profession in the world. He ought to remain longer in college. Why? The solution is simple: Because his future occupation offers a barrier to all subsequent intellectual development. He is going to have the hardest work to make a living. Some one on the outside says, "They all get rich." Do they? The most of those that I know are poor men. So much of our time has to be devoted to manual labor that a man has no opportunity to exercise his mental faculties. A large percentage of operative dentists become mere routine manual laborers. For this reason a man should be an educated man before he becomes a dentist. Teaching from text-books is like learning the catechism,—kindergarten work, instead of the work of men acting upon their own responsibility; children poring over their lessons instead of having it impressed upon them, stamped deeply into their minds by the individuality of the teacher. If you introduce the primer method, you will bring into the schools men from the lower classes, men not made for the professions.

Dr. Marshall. I am gratified at the trend the discussion has taken. I quite agree with Dr. Taft that there are certain subjects that can only be taught by the didactic method. Before an investigator in certain lines is ready to publish them in book-form his views are already stale. It needs prompt presentation in didactic

form, followed by original discussion. He wants the privilege of presenting his views in the form of lectures. But the fundamental principles of anatomy, physiology, etc., are better taught by the recitation system than by lectures. The ground to be covered is so large that a lecturer would never get through. Let the groundwork be by recitations. Dr. Barrett said that the teacher, like the poet, is born, not made. That is also my idea. There are so very few men who have the eminent qualifications necessary for teaching by the didactic method. The average professor is a busy practitioner who has not time to prepare lectures as they should be prepared; therefore let him avail himself of text-books, the best that are to be had. Dr. Crawford made a good point for my paper when he said that lack of time and the turmoil and labor in the life of the dental practitioner do not allow time for original work and investigation, or for but very little. Men are too tired when night comes, after a hard day's work, to be able to do much mental work. Original investigations in histology, etc., demand a man's whole time and his freshest vigor. Our teachers will never be able to do what they should do until our colleges are endowed. Then such men as Dr. Black and a few others will be enabled to give all their time to scientific investigations, being paid for it outside of daily practice. A subject demanding such investigation is pyorrhea alveolaris, but nothing can be attained when but one or two hours a day can be given to the subject. If one or two men in the schools could give all their time to such studies great progress might be made, with results of great practical value to the profession. Dr. Crawford says that the use of text-books would be going back to the primer or kindergarten methods. But there are many text-books in anatomy, physiology, etc., that demand serious, earnest study. The student would find much in such books that would require a teacher to explain it before he could feel that he knew it. Teachers should also do more in the line of teaching students how to apply what they have learned.

On motion, adjourned to 10 A.M.

(To be continued.)

AMERICAN DENTAL ASSOCIATION.

(Continued from page 947.)

THIRD DAY—*Morning Session* (Continued).

SECTION VI, Physiology and Etiology, was called, and the chairman, Dr. J. D. PATTERSON, Kansas City, Mo., read the following report:

The etiology and physiology of the oral cavity grows in importance with increased dental knowledge, and of the dentist who is in reality a professional man, more education in these important fields is year by year demanded.

We cannot separate the knowledge of the causation of disease demanded of the physician and surgeon, or the physiology in

organized bodies from that which is demanded of the doctor of dental surgery. They are one and the same, save with a difference in anatomical locality. The most ultimate ramification in the wonderful physiological processes, or the most minute cause which impairs function must ever be part of a great whole, and cannot be understood by study of only one variation or branch of these extensive subjects.

For the dental surgeon the researches of late years in the field of the physiological germicidal action of the blood has been of absorbing interest. In the report of this section for 1895 it was predicted that the dental profession would make practical application of the discovery of the efficiency of nature's germicide.

In the literature which has come to us during the past year, we glean from the *Annual of the Universal Medical Sciences*, Dr. Sajous, editor, the following upon phagocytosis: "The controversy as to the part played by phagocytes still continues." Metchnikoff is chief, of course, for the phagocytes and Pfeiffer chief of the opposition. They each have many supporters. Pfeiffer claims that the destructive processes come "through extra cellular action, and that the serum alone exerts bactericidal power;" that the dead germs, which he, with Metchnikoff, acknowledges are found within phagocytes, were dead when they were surrounded or taken in,—killed by the serum.

Connected closely with this question is the one of "immunity" and what part antitoxins play. Büchner, 1896, thinks that immunity is not the result of a direct action of the antitoxin upon the toxin, but that "both act antagonistically upon the cells of the human system." Kosséll "looks upon the bacteria-destroying power of nucleinic acid as playing a part in the development of immunity." Metchnikoff agrees with this because it gives a part to phagocytosis in the acquisition of immunity. Roux "likewise looks upon immunity as due to cell activity." Editor Sajous says, "The preponderance of evidence gives nucleinic acid the greater part in immunity. The question, however, as to whether the acid acts exclusively as a bacteria-destroying agent, or if, by its acidity, it neutralizes the toxins, remains unsettled."

In the *New Surgery*, issued since our last meeting, edited by Dr. Roswell Park, we find on page 312 the following of interest to the dental surgeon: "The study of the bacteria of the mouth is of great interest to the surgeon. The relationship between mouth bacteria and local lesions of the teeth and jaws and mucous membranes, of secondary gastric disturbances, and the study of the mouth, as a first point of infection for both local and general diseases, is a wide subject. Suffice it to say that, normally, the mouth contains scores of varieties of bacteria,—saprophytic usually, but including also common pathogenic forms, which may be found as normal inhabitants of the mouth without injury to the individual,—but if the vitality of the tissues is lowered to a sufficient degree, these pathogenic germs may find a favorable breeding-ground for the production of disease. The mouth furnishes a point of infection for most pathogenic germs,—*e.g.*, those of diphtheria,

erysipelas, actinomycosis, the oïdium albicans of thrush, tubercle bacillus, and the virus of syphilis."

In passing, it may be remarked that the enemies of the therapeutic system, which has been built up on the basis of bacteriology, are still, as ever, very active. Leibrich still declares that the Koch system of treating tuberculosis has no prospect of ultimate success. The consensus of scientific opinion, however, is largely upon the side of the bacteriological factor in the majority of diseases.

In the literature which has appeared since our last meeting, one year ago, bearing upon the subjects of this section, we note an essay upon "Experimental Study of the Different Modes of Protecting the Oral Cavity against Pathogenic Bacteria," by A. C. Hugenschmidt, M.D., D.D.S., Paris, France, DENTAL COSMOS, October, 1896. An interesting statement in this essay is that after certain oral operations, such as the extraction of a tooth, the soft parts of the injured territory often present the appearance of an ugly wound, and when we think of the pathogenic germs often found in the mouth, it is difficult to understand why such an exposed wound is not more often the seat of severe local trouble, or that it does not bring on a general infection of the economy.

There is no doubt that the severe local inflammations, which sometime arise, are because of this invasion, and the operator should take all precaution. Usually the phagocytes and the chemico-tactile and mechanical properties of the oral fluids prevent injury. The entire article of Dr. Hugenschmidt upon the wonderful immunity of the oral cavity and the reasons for such immunity is of absorbing interest to the dental surgeon.

We note an article upon "Diseases of the Oral Cavity a Potent Factor in General Disease," by Dr. S. W. Foster, Atlanta, Ga., read before the Dental Section of the American Medical Association, 1897, published in the DENTAL COSMOS, in which the author names the following dental irritations as productive of general disease:

First, dentition. Impacted teeth, causing obscure neuroses; destruction of masticating power, causing dyspepsia and gastritis; general lack of oral hygiene, which poisons nutrition, causing nervous debility and giving down of the vital forces, also consumption. Of this last the author says, "It is rare that we see a consumptive in whom we do not find a typical case of pyorrhea, or at least pus exuding from around the necks of teeth, and it seems that the breathing into the lungs of the effluvia from these suppurating sinuses of the mouth might produce this fatal disease."

We note a paper upon the "Etiology of Fetor ex Ore," by Dr. Jerome Allen, M.D., D.D.S., in which especial attention is called to the fact that the most persistent and lasting fetors are due to the chronic and exudative diseases of the gums, bones, and mucous surfaces. This, we think, will be appreciated by those having pyorrhea under treatment.

In the *International Dental Journal*, December, 1896, is noted an article by Wm. H. Trueman, entitled "Pyorrhea from a New Standpoint." In regard to etiology, the author strongly inclines to the

belief that the disease is a germ infection. He says, "We may remember, also, that of all germicides known to science, none are so potent, so thoroughly reliable, or so universally accessible as are the natural secretions of a healthy human mouth. Were it otherwise, it would be utterly impossible to find a healthy individual among the many thousands who are compelled to daily breathe the germ-laden dust of a large city. It is only when the germ succeeds in quickly finding a little pouch in which to hide, secure from this, to it, destructive secretion, or when by mere chance it obtains foothold, while the potency of this secretion is temporarily impaired, that it has the slightest chance to begin its destructive work. Once firmly settled, it begins to thrive, and a colony once formed creates conditions that may successfully combat its untoward surroundings. Changes constantly taking place in the oral secretions —now favoring and now opposing—fully account for the ebb and flow that marks, in its earlier stages, this disorder. The ravages of the disease, never wholly obliterated after it has once been firmly established, are ever an open door inviting the frequently noted relapses, until the complete loss of the teeth destroys forever its once favorite camping-ground."

We note a paper upon "Pyorrhea Alveolaris," by Dr. Geo. B. Clement, Macon, Miss. Dr. Clement claims that the disease is caused by hypercalcic deposit in the cementum and from the cells which form that structure.

"Pyorrhea Alveolaris," by J. W. Wassall, M.D., D.D.S., Chicago, *Dental Review*, June, 1897, in which the writer, speaking of its etiology, suggests a constitutional disorder, found in eczema, which he believes has an important relation to the affection.

In Roswell Park's *New Surgery* is found the following: "Stomatitis catarrhalis" is a simple catarrhal condition, resulting from irritation of the mucous membrane from mechanical, chemical, or mycotic causes. It presents the symptoms of a desquamating catarrhal condition."

A paper upon "Pyorrhea Alveolaris," by J. E. Cravens, D.D.S., Indianapolis, *Dental Digest*, August, 1896.

A criticism of the uric acid theory of pyorrhea, entitled "Peculiar Pathological Perceptions," by J. D. Patterson, D.D.S., *Dental Review*, March, 1897.

We further note an essay upon "Stomatitis the Cause of Various Throat Diseases," by Isidore Lett, D.D.S., Philadelphia, DENTAL COSMOS, September, 1896.

In *International Dental Journal* we find an essay upon "Nasal Obstructions which Result in Mouth-Breathing, with Special Reference to Adenoid Vegetations," by George L. Richards, M.D., Boston. The writer has the following to say upon the etiology of nasal obstructions: "The cause is not very clear. Heredity and climate, especially the latter, seem to play a part, as they are found more frequently in the North and on the coast than inland and to the South. Scrofula, measles, scarlet fever, and whooping cough are causative."

An essay upon "Salivary Calculi," by Gustav Futterer, M.D.,

International Dental Journal. In regard to causation, the author gives proof that in a majority of cases the disease arises from calcic matter being deposited in the ducts. He says, "Small pieces of tartar often break down and can very easily enter the ducts, especially Wharton's duct, and here we find the most calculi, which are very rare occurrences in Steno's duct. Gravitation will bring the pieces down to the bottom of the mouth rather than up to Steno's duct; they will remain there longer, and occasion to enter will offer itself more readily." The same rule holds good in animals. The theory that the uric acid diathesis is causative of these deposits is discouraged by the author.

In the DENTAL COSMOS, February, 1897, appears an article by Dr. M. H. Cryer, M.D., D.D.S., upon "The Contributions of Dentists to Surgery." In the domain of etiology, Dr. Cryer states in this article, "When we speak of the connection between surgery and dentistry, we generally look at but one side,—the extension of dental disease to other parts; but there is another feature to be borne in mind,—the fact that disease processes in other parts of the cranium may affect the teeth through extension from comparatively distant anatomical parts. In an address delivered at the 1895 meeting of the American Dental Association I called attention to the fact that the infundibulum leading from the frontal sinus frequently opens, not into the middle meatus of the nasal chamber, but into the upper anterior portion of the maxillary sinus. I have seen several cases in which this anatomical feature has had a direct clinical bearing. Catarrhal disorders, which were first evident in the region of the frontal sinus and anterior ethmoidal cells, have become chronic; later, evidences of disorder have become manifest in the region of the antrum, causing a feeling of heaviness and dull pain. After a period some of the posterior teeth give evidence of pericementitis, without any evidence of caries or any history of injury. In some of these cases pus may be found exuding from about the neck of a tooth or teeth. An inflammation of the lining tissues of the antral wall has caused closure of the arteries supplying the pulps of the teeth, which have died, and septic inflammation has ensued. An examination by electric light will show the presence of an exudation in the antrum, and in some cases the extraction of a tooth may be followed by an escape of pus and mucus from the antrum."

"The Relation of the Teeth to the Ear, Nose, and Antrum," by O. F. Gambati, M.D., Houston, Texas. The particular phase of thought found in this paper may be said to lie in the claim that an empyemic condition of the antrum sets up a pathological condition of the teeth.

In the *Practitioner and Advertiser*, July, 1897, the editor, Dr. W. C. Barrett, in speaking of the etiology of "Diseases of the Maxillary Sinus," says, "Renewed attention has been directed to the fact that a diseased condition of the frontal and other sinuses is sometimes present, thus preventing disease supposed to be wholly in the antrum. When the case is obstinate it is recommended that other cavities which may drain into the maxillary sinus should be exposed."

In February Cosmos, 1897, James S. Gilliams, M.D., D.D.S., relates a case of "Herpes Zoster Associated with Dental Trauma," in which the eczema appeared upon the left temple and involved the eye, caused by a diseased left superior cuspid, and which trouble disappeared upon the extraction of the tooth. The distant trouble is thus diagnosed by the author, "The diagnosis of this case is one of considerable interest. It may fairly be assumed that the injury from the diseased tooth set up a neuritis which extended, first of all, to the temporal terminations of that nerve, and subsequently involved the supra-orbital branches of the ophthalmic or first division of the fifth. The cutaneous branches of the supra-orbital nerve supply the integument of the cranium as far back as the occiput, and some of its branches are distributed over the frontal and parietal bones. From the excruciating character of the pain within the cranium and the inflamed condition of the eye, it is probable that the neuritis affected not only the peripheral terminations, but also the trunks of the supramaxillary and ophthalmic branches of the fifth nerve."

"Cancer of the Lip," by C. L. Gibson, M.D., New York City, Dental Cosmos, June, 1897. The causation of this disease is noticed as follows: "As regards the causes of this disease, to traumatism, in general, is ascribed the chief place. The lips are easily abraded, cracked, chapped, burned, and otherwise maltreated, so that abundant sources of irritation are furnished. As regards the element of heredity, there is an ever-increasing tendency to belittle its importance. It is undoubtedly true that the belief in heredity, so strong until recent years, was based to a great extent on tradition. The strong efforts which we are all making to place medicine upon the plane of an exact science discourage the acceptance of vague theories and histories concerning cancerous relationship, and, subjected to an exact scrutiny, the family history of cancer is reduced to so small an extent as to be looked upon only as an interesting coincidence." The author also points out that it is startling to see how many cases of lip cancer have been "acquired by living in dwellings previously occupied by the subjects of cancer."

The subject of "Dentistry and its Relation to Medicine" is the subject of a paper by Archibald Dunn, M.D., in *Dental Practitioner and Advertiser*, April, 1897, in which the author cites two recent cases in his practice: One in which hemicrania was caused by an obscure cavity in the buccal surface of an upper third molar, and one in which convulsions and epilepsy had causation in a filled lower molar.

As chairman of this section, I have in no way covered the field of etiology and physiology for 1896-97 as the subjects deserve, but have only noticed essays which have come to my notice, which seemed to bring out some new, or comparatively new, line of thought.

(To be continued.)

Pennsylvania State Dental Society.—Annual Meeting at Glen Summit, Pa.

(Concluded from page 971.)

Third Day—*Morning Session* (Continued).

Following the description of Dr. Huey's paper, the regular order of business was suspended, in order to hear the report of the council respecting their resolution, passed at the previous session, in reference to a pamphlet sent to members of the profession, and purporting to be a reprint from the "Proceedings of the Odontological Society of Pennsylvania."

The report stated that the editor of the "Odontological Society" had complied with all the provisions of the resolution reported by the council and accepted by the society, and had voluntarily offered a statement setting forth the facts of his connection with the matter and the steps he would take in correcting any misconception which might have arisen from the distribution of the pamphlet.*

The report of the council was received and adopted.

The following committees were appointed by the council:

Executive Committee—I. N. Broomell, J. K. Lippincott, H. W. Arthur.

Legislative Committee—E. C. Kirk, Louis Jack, G. W. Klump, A. S. Koser, J. A. Libbey.

Committee on Enforcement of Dental Law—H. S. Seip, W. D. Delong, H. N. Young, George Sheidle, George B. D. Darby.

Publication Committee—C. V. Kratzer, H. H. Burchard, E. C. Kirk.

Clinic Committee—G. L. Jameson, G. L. Simpson, J. N. Warner.

Exhibit Committee—F. D. Gardiner, C. B. Bratt, H. B. McFadden.

A number of places for the next meeting were nominated, and the duty of selecting a suitable place was referred to the council, with power to act.

Dr. Libbey then read a communication from Dr. Crouse in the interest of the Dental Protective Association, asking for the co-operation of the society in securing additional members. Dr. Libbey, Dr. Kratzer, and others spoke favorably of the work of the Protective Association.

The chairman moved that an appropriation of one hundred dollars be made from the funds of the society for the benefit of the Protective Association. Dr. Stellwagen later amended the motion to make the appropriation two hundred dollars. After a general discussion of the subject the amendment was put and carried.

The council reported that they had selected Cresson Springs as the next place of meeting.

The committee appointed to draft resolutions upon the death of Dr. Slegel, of Reading, made a suitable report, which was adopted.

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* Dr. Head's statement appears in full at page 671 of the Dental Cosmos.

The reading of papers was then taken up, and Dr. J. C. Hertz, of Easton, read a paper, entitled "Art and Hygiene Simplified in Porcelain Crown-Work," as follows:

Art and Hygiene Simplified in Porcelain Crown-Work.

In this subject I will endeavor as much as possible to avoid comparison with old methods, except where it is necessary to compare the improvement made in this class of work. I shall try to make clear a part of our operations in this line, which has been made quite practical by the introduction of the smaller appliances for fusing porcelain bodies, such as the electric oven and gas furnaces. The demand for this artistic work is increasing in proportion to the wholesale use of the all-gold crown. The latter is at present very much abused in its application, causing a reflection upon the art of our profession. "Art is to conceal art" should be our motto in all operations where the conditions and materials at our disposal can be practically, artistically, and hygienically used.

In the making of crowns we have had placed at our command, within the past five years, apparatus which greatly facilitates this line of work, so that it is done with accuracy, assuring success, and enlarges the field for the practical use of porcelain crowns, secured to the metal post and band with porcelain body, thereby secluding all metal from external view. The method still allows the use of the most perfect, practical, and cleanly attachment known,—viz, a ferrule and cap, with a dowel-pin passed through the cap and soldered to it. This method has been in use for years in gold as a base for mounting porcelain crowns, facings, or veneers, making the attachment between the dowel-pin and porcelain crown with gold backing, and then the whole united with gold solder. This has been the ideal crown in the past, and is quite artistic and as cleanly as gold and porcelain in contact can be made.

The protection to the root is good, though the porcelain crown or facing is deficient in strength, compared to the all-porcelain crown with band, unless the latter is reinforced with gold cusps or cutting-edges. They then become the least liable to fracture from occlusal stress. But then we have greatly sacrificed art by, in most cases, exposing gold to view at two portions of the crown, —viz, occlusal portion and gingival margin.

In describing the ideal porcelain crown I do not wish to give in minute detail the methods in general use, from the preparation of the root to the completed adjustment of the crown, but to show my method of simplifying some of its construction, and the artistic result that can be more readily attained. When preparing the root for the capped band I proceed differently from the method of others. Dr. J. H. Downie, who described the full details of the method for making these crowns at the time he introduced his gas furnace, said, "Dress up the root even with the gum, and prepare it in the usual manner." I have, however, found it best to cut off the decayed crown or fragment within one-sixteenth of

an inch of the gum-line; then trim down the root beneath the gingival margin fully one-twentieth to one-sixteenth of an inch, as the case requires. Leaving the extra one-sixteenth on until the trimming is done will make the cutting of root much easier with bur or trimmer. The root must be trimmed almost straight (cone-shaped but slightly) to allow the band to have secure bearing.

I trim more on the labial portion than on the lingual. It is usual in such attachment to reduce the projecting root-end to an inverted cone-shape, though I have not seen it advocated to reduce the outer surface more than the inner. This reduction of the root is a tedious operation, unless frequently done. I have endeavored to devise some way to overcome the prominent position the crown must be placed in to allow for the porcelain to cover the band. This is usually the result, whether the crown has been cut off even with it or ground out, so that a portion of the crown extends as high as the gingival margin, or, as sometimes placed, as high as the ferrule-margin. When the anterior portion of root is not cut down sufficiently to allow for the band and porcelain crown, when finished, to be on a line with the natural teeth, or its root, it is evident that it will be too prominent, not to mention the excessive fullness exposed at the cervical margin. Otherwise, if the fullness is not reduced, the porcelain covering will be too thin for strength and the proper shade over the ferrule. The latter should always be made from iridio-platinum plate, 28 gauge. Some use No. 30 and 31 gauge. I prefer 28 gauge, as it makes a stiff band and allows metal for trimming, which should be brought to a feather edge.

Many of the failures with porcelain flaking off the metal at the cervical margin are mostly due to the band being too thin. If of sufficient thickness (28 gauge), it prevents springing when inserting the crown. I always use iridio-platinum (platinum containing ten per cent. of iridium) for such work instead of pure platinum; it affords greater strength in the capped ferrule and dowel. Then, having the post soldered to the cap, you have a structure which fits with accuracy and does not allow any spring to cause fracture of the margins. As already stated, the best way to avoid the flaking or fullness is to cut down the anterior portion of root, which provides more room for the band and porcelain and gives a degree of thickness that assures ample strength. The iridio-platinum plate for the cap that the dowel passes through should be much thinner than the ferrule (34 to 36 gauge), which will afford an easier adjustment of the dowel by making a small puncture, then forcing it through, which provides for the most artistic arrangement of the crown. The selection of the crown, facing, or veneer should be made with care to not only have the proper shade, but sufficient length, so that it can be ground to fit over the band as high as it extends whenever practicable. This part may be quite thin, only so it retains the shade, as it is not necessary to be adapted closely to the capped band, as that will be filled out with porcelain body fused on. We have a great variety of teeth to select from: my preference, however, is for

plain plate teeth, long cross-pins, but I have used plain rubber teeth, and even those where there were no pins. The facing is fused directly to the iridio-platinum. The plan of allowing the tooth to extend to the gum-margin and beneath greatly simplifies the adding of body and the annoyance of frequently putting it through the heat several times to blend the body with the shade of crown. This is a rather uncertain process with the only porcelain body that has thus far been made in an attempt to give different shades; there is a tendency for the color to float to the edge of the body; it also avoids the deleterious effect of too much heating. In reference to the porcelain bodies made for crown and continuous-gum work, my experience is that, for the class of work here considered, Downie's porcelain body for crowns and small pieces is the most practical, as it avoids etching of the crown, when invested for the first baking, which secures it to the metal parts. While Close's and all high-fusing bodies will cause, from the high heat required, an etched surface from the investment of fire-clay and plaster, this can be remedied by the extra work of first soldering the crown to the dowel-pin, though it is unnecessary for strength and not certain to retain the parts in position. This low-fusing body, when used according to the manufacturer's instructions, has given ample strength, but I give it one and a half to two hours for the final tempering and cooling, and not twenty-five minutes, and have thus overcome the cause of its brittleness and porosity. The Custer electric oven is best adapted for this work, as it is almost automatic.

The gum-tissue conforms readily to the porcelain, due to its glazed surface, and is least liable to cause irritation, owing to the union and symmetrical blending of the porcelain with the metal. All crowns of this class are set with chloro-percha, when the canal has not been enlarged from decay, by first putting a film of the solution about the dowel, allowing partial evaporation before inserting. If it has been enlarged from decay, first apply the chloro-percha, then use cement over it. This gives an attachment by which, if necessary, it can be readily removed in the future by simply heating the crown.

If the points here noted are observed in the making of the porcelain or "Downie crown," we restore nature's defect with less trouble,—the artistic result considered,—and produce the most practical, cleanly, and artistic crown obtainable at the present.

Discussion.

Dr. HOLLISTER. I make crowns very much like one of these passed around in the box. With regard to the Custer furnace, I know nothing about it. I use Downie's. Sharp's furnace will cool very slowly, and I think it as good as Downie's. I agree with the essayist in one thing,—that the body fuses with too high a heat, and requires great care to produce a satisfactory result.

Dr. LITCH. I have had no practical experience in the use of the Downie crown, although I recognize some of its points of merit, one being the fact that there is no gold in view, and that,

as the porcelain facing is not backed with metal, it has a greater translucency and a more natural appearance.

For the anterior teeth, where the overbite is close and deep, Downie's crowns have points of weakness. Porcelain is a fragile material, and in such cases it is difficult to get a sufficient amount of body to secure strength without interfering with occlusion.

I was very glad that the essayist emphasized the desirability of having a good thickness of metal in making the bands or caps. It is, I think, a common error on the part of practitioners to select a gauge of platinum or of gold too light,—as high as 30 of the standard gauge. That is extremely thin. It does not allow of feathering the edge and of much polishing without penetrating the metal itself. Platinum should be alloyed with iridium, in order to give it greater rigidity, because rigidity in the basic cap is necessary to preserve the integrity of the porcelain material; without it, the porcelain is certain to crack and flake away. Twenty-eight standard gauge I regard as a good number for all caps, whether for the Richmond or for the Downie crowns.

The subject, upon motion, was then passed.

The chairman then stated that there was another paper to be read, that prepared by Dr. F. A. Peeso.

Dr. Libbey. There is nothing so unsatisfactory to the writer of a paper as for some person else to read it for him. I would not, under any circumstances, submit a paper to an association to be read by another person. Considering the lateness of the hour and Dr. Peeso's absence, I move you that the paper of Dr. Peeso be read by title, and that it be printed with the transactions and be published.

Motion carried.

Dr. Peeso's paper follows:

Crown- and Bridge-Work as a Specialty.

Mr. President and Gentlemen.—The advances made in the different professions within a comparatively few years have been wonderful, and in none has there been more marked progress than in our profession. It is only a short time since dental operations were confined to the extraction of aching teeth, and this was done by blacksmiths, barbers, and surgeons. Then came the filling of teeth and dentures carved from ivory and other materials. This was followed by the era of gold and silver plates, with the teeth carved and baked by the dentist himself. It was at this time that the highest degree of skill in metal work was reached, and, to become an expert plate-worker, years of practice in the laboratory were needed. With the advent of vulcanite began the decline of metal-workers. Gold and silver plates gave place to rubber, and a great many of the younger dentists knew nothing of metal work at all. The introduction of crown- and bridge-work has again rendered necessary the knowledge of working in metals, and it is to be hoped that the time will come when our young men will reach a higher degree of skill than ever before.

Among the first crowns to be made were the old pivot crowns. These were made of porcelain, and were fastened in the roots with wooden pins. For a long time this was the only crown, and but few of these were used. Where the crown of the tooth was gone the root was extracted and a partial plate made. In time soldered crowns with facings and full gold crowns came into use. Then the root was banded, and we had what is known at the present time as the "Richmond crown." A dummy attached to one of the soldered or full gold crowns constituted the first bridge, and the operator little dreamed of the importance of this step to the profession. For years the work was confined to a few dentists, and was not over-successful at that. As it became better known it was taken up by unscrupulous men, who thought there was money to be made out of it, and who put it in anywhere and everywhere for the one purpose of extracting money from their confiding patients. In most cases the work proved worthless, and, instead of being a benefit to the patient, was a positive injury, no care being given to the preparation of the mouth, or, in fact, to any part of the work. A few believed in it, and did the work conscientiously and with satisfaction to their patients, but with the others the work was unsatisfactory and worthless, and in time bridge-work was condemned by most of the leading men of the profession; but the few believers persevered, striving to improve the strong and eliminate the weak points, and their success, at last, convinced the doubters that there was something in it after all, and that bridge-work had its place in dentistry.

It was with some hesitation that I undertook to write on "Crown- and Bridge-Work as a Specialty," for, being something of a specialist in this work myself, it may seem like egotism to plead for it as a separate branch. It has been said by some of the most noted men in the profession that "the time has come when we must have specialisms in dentistry, the same as in the medical and other professions." Mechanical work, operating and extracting, are becoming specialized, and it seems to me that crown- and bridge-work is more widely separated from the general practice of dentistry than either of these.

Bridge-work being comparatively new, a great many of the older and leading dentists, and, in fact, the majority of them, make no attempt to do it, for the reason that their time is, and has been, so filled that they have not been able to give the time required to construct it, especially in the case of pieces of considerable size.

Where the work is indicated and properly done, it is the best thing that can be done for the patient, and where it is poorly done, and the conditions are not favorable, it is the worst, and will cause more trouble to both patient and operator than any other form of denture.

To be most proficient in this work, a man should give his whole time and attention to it, to the exclusion of operating or other mechanical work. By constant practice he becomes more expert, and, in time, some parts of the work become almost automatic.

Careful study should be given to the shape of the roots, their position, the form and direction of the pulp-chamber and canals, and also to the treatment of diseased, loosened, and fractured roots, and those decayed and broken off below the gum-line. He should practice removing the enamel and shaping the teeth and roots for the reception of crowns and bands, in order to be able to do it most quickly and with the least pain to the patient. In the fitting of bands in the mouth, opening up the canals, changing their direction, and numberless other things, he should be able to work with an ease and certainty that will inspire confidence in his patient, for every practitioner knows that, whatever the operation may be, if the patient has perfect confidence in his ability, he can do the work better, easier, and in much less time than he could do otherwise. He should make a special study of oral surgery and the pathological conditions of the mouth, and be able to treat successfully the diseases most commonly met with.

As to the mechanical training necessary, in the beginning there is probably nothing that would be of as much benefit as a course of study in a jewelers and watchmakers' school, such as there are in the large cities. The student acquires a delicacy of touch and a skill in fine work that can be gotten in no other way. Metallurgy should not be forgotten, especially in the refinement of gold and other precious metals and the making of alloys. From this on he should prepare models and make pieces from brass or other metals for practice, trying to approach the natural shape and contour of the teeth as nearly as possible and articulating as for practical work.

In actual practice, if patients are few at the beginning, he should keep up his work on models and strive to invent newer and better methods and easier and quicker ways of doing the work. In this way he keeps his hand in practice, and is always ready for actual cases when they come.

It is unquestionably true that a person, by giving his entire time and attention to any particular branch, becomes much more proficient than if he is working at several different things.

Very few of our leading men have the time to do this work, and, in the absence of specialists, plates are inserted where, in a great many cases, a bridge would be better and much more acceptable to the patient. Probably in a great many instances the patients who needed this work would refuse to go to a specialist, but, in time, if it were understood that there were specialists in this branch, the same as for the treatment of the eye, ear, and throat in the medical profession, they would become accustomed to it and would accept his services.

After the induction to office of the president-elect by the retiring president and the transaction of some items of unfinished business, the society adjourned, to meet at Cresson Springs, on the second Tuesday of July, 1898.

NORTHERN ILLINOIS DENTAL SOCIETY.

TO THE PRESIDENT AND MEMBERS OF THE NATIONAL DENTAL ASSOCIATION, AND TO THE PRESIDENT AND MEMBERS OF THE NATIONAL ASSOCIATION OF DENTAL EXAMINERS:

Gentlemen,—At the tenth annual meeting of the Northern Illinois Dental Society, held at Rockford, Ill., October 20 and 21, 1897, the undersigned were appointed a committee to draft and present to your associations suitable resolutions, with a view to remedy an existing evil regarding the interstate practice of dentistry, and we herewith submit the following for your consideration:

WHEREAS, A legal practitioner of any one of the United States, who desires to remove to another state, is, under the existing laws, compelled to comply with certain requirements of the dental law of that state; and

WHEREAS, In many instances such legal practitioner (sometimes of many years' experience) is subjected to a more or less severe theoretical examination, which cannot even be successfully passed by many who are fresh from the college halls; therefore, be it

Resolved, That the National Association of Dental Examiners and the National Dental Association be and are hereby requested to enact such rules, or to secure such modification of the dental laws of the various states, which, under reasonable restrictions, will enable competent practitioners to remove from one state to another without being compelled to submit to provisions which are eminently unfair to a large number of capable dentists.

LOUIS OTTOFY,
W. H. TAGGART,
M. L. HANAFORD,
Committee.

Attest:
JAMES W. CORMANY, *Secretary.*
Dated November 10, 1897.

Following is the list of officers of the society elected for 1898: C. B. Helm, Rockford, president; Louis Ottofy, Chicago, vice-president; James W. Cormany, Mt. Carroll, secretary; M. R. Harned, Rockford, treasurer; E. J. Perry, Chicago, member of executive committee.

JAMES W. CORMANY, *Secretary.*

DENTAL SOCIETY ANNOUNCEMENTS.

SOUTHERN DENTAL ASSOCIATION—BRANCH OF THE NATIONAL DENTAL ASSOCIATION.

THE next meeting of the Southern Dental Association, as a branch of the National Dental Association, will convene in St. Augustine, Fla., February 22, 1898, to February 25, inclusive.

The president and officers of the association have been actively at work for the past few months, and have met with gratifying encouragement. This being the most delightful season of the year to visit Florida and the quaint and historic city of St. Augustine, we predict that this will be one of the most largely attended and profitable meetings during the history of the Southern. Headquarters at Ponce de Leon Hotel.

S. W. FOSTER, *Rec. Sec'y.*

Southern Kansas Dental Association.

The Southern Kansas Dental Association will meet at Wichita, Kan., December 27, 28, and 29, 1897.

U. S. Hoagland, *Secretary.*

EDITORIAL.

Chloroform in Dentistry.

The *Lancet*, of September 4, 1897, makes the following observations anent a case of fatal chloroform narcosis, which formed the subject of special comment in this journal for September:

"A death under chloroform occurred at Rhyl, on August 13, under circumstances which confirm our often-expressed opinion that chloroform is not a desirable or safe anesthetic for dental practice. The patient in this case was a woman, aged twenty-nine years, in good health, and described as being strong and free from fear of the anesthetic. She had very bad teeth, and a local dentist advised the extraction of twenty-seven of them. A medical man was called upon to give an anesthetic, and he advised the use of chloroform. In his evidence* he said that he had examined the patient and judged she was in a fit state to take the anesthetic. He considered nitrous oxid gas would be insufficient for so extensive a clearance, and added, 'It was quite a usual thing to administer chloroform in cases of dental surgery which occupied some time, *and chloroform was as safe as any other anesthetic.*' It is to be presumed that this statement, beside its general application, was meant in particular to apply to dental surgery, and it is in this connection that we cannot but feel so sweeping a pronouncement is hardly in consonance with either the facts of this particular case or with the experience of the last fifty years. To refer for one moment in detail to the case. The patient was placed in a chair, and after the chloroform had been given from a mask for fifteen minutes the medical man signed to the dentist to commence the extractions. This was done, and after three teeth were removed the operator was requested to stop, as the patient had become 'blue in the face' and 'the breathing had stopped.' It is further stated that just before the operation the patient struggled slightly, 'as was usual in cases of the sort.' They lifted the patient out of the chair, 'but she was dead three or four minutes after she was placed on the floor.' It would seem, therefore, that when the patient struggled she was not fully under chloroform, and this was after about thirteen or fourteen minutes of inhalation; then she at once became fully under the influence of the anesthetic, and the operation was proceeded with. Probably during that struggle the overdose was inhaled, and the interval before the chloroform actually stopped respiration by its action upon the medullary centers was taken by the dentist in drawing three teeth. It is obvious that the actual manipulation of the tooth-extraction interferes both with respiration and the proper watching of the chest movements. Many medical men on such occasions assist their dental colleagues by holding the

*Liverpool *Mercury*, August 16, 1897.

patient's head, and so have their attention withdrawn from the function of respiration and the condition of the patient. These are manifest objections to using chloroform, and a still further one is that it has been shown that the sitting position is one which increases the patient's risk under that anesthetic. But the most cogent adverse reason to the use of chloroform in such cases is the extremely high mortality, which reference to the report of the *Lancet* Commission Appointed to Investigate the Subject of the Administration of Chloroform and Other Anesthetics from a Clinical Standpoint, in 1893, shows only too plainly. We cannot agree with any statement that chloroform in dental operations is as safe as ether or the A. C. E. mixture. It is a very great question whether it is wise to attempt to remove twenty-seven teeth at one sitting; but if cases do arise in which such an heroic proceeding is considered justifiable, then certainly ether or a mixture should be used rather than choroform. The only way in which the last-named anesthetic can be at all safely employed in dental surgery is where the patient is placed under the same conditions as if he or she were about to undergo a major surgical operation. This cannot be done in the ordinary routine work of the dental surgeon. The patient must be prepared by abstention from heavy food, must have all clothing absolutely removed and replaced by a dressing-gown, and must be placed in the recumbent position. We cannot but feel that for so comparatively trifling a matter as having teeth out no one's life should be jeopardized by the use of chloroform unless the fullest precautions are taken and the risk looked clearly in the face. Many country dentists may point to a large experience of chloroform without mishaps, but their fortunate cases cannot counterbalance or lessen the horror of a fatality such as that at Rhyl. We cannot speak too emphatically. This case is almost identical with one which happened only recently, and which was recorded in our columns."

It is worthy of note, and also a matter for careful consideration, that so high an authority on chloroform anesthesia takes such definite ground with respect to the use of this agent in dentistry, and it is especially noteworthy that it recognizes not only the great danger which attends the use of chloroform as an anesthetic in dental surgery, but as an anesthetic in any case. Not only is this position supported by general statistics, but the chloroform question has formed the basis of several carefully conducted researches, in which its dangerous factor as an anesthetic has been scientifically demonstrated. In the face of such evidence and the fact that there are equally efficient anesthetics which are relatively safer, we insist that the continued use of chloroform as an anesthetic is inexcusable, and should be prohibited by law.

The *British Medical Journal*, beside reporting the fatal case at Rhyl, before referred to, records three other cases of fatal chloroform-poisoning in connection with operations other than dental. There can be no doubt that were an equal number of deaths caused under conditions analogous to these with any other anesthetic than chloroform they would arouse public sentiment to a degree

which would eventually prohibit the use of a method or means so disastrous in its consequences.

Correction.

Dr. W. E. Walker, whose article on the "Facial Lines and Angles in Prosthetic Dentistry" appears in our October issue, requests us to make the following corrections of errata which inadvertently occur in the paper as published:

The descriptive inscription under Fig. 5 should be omitted, as the explanation of the illustration is correctly made in the text. On page 795, line 5, the index letter L should have been M. On page 799, line 4, the word "guiding" should have been "grinding." On page 800, line 22, the words "condylo-facial angle is the" should be inserted between the words "the" and "condylo-occlusal."

OBITUARY.

In Memoriam.—Dr. Joseph R. Woodley.

Entered into rest on the 29th day of September, 1897. A distinguished citizen, known and honored among his fellow-men, and among the civil, social, Christian, and professional organizations with which he was associated in his native Southland. A grand and good man has passed away, who was as warmly loved as he was widely known,—Dr Joseph R. Woodley, of Portsmouth, Virginia, "Has crossed over the River and rests under the shade of the trees."

The annals of the professional and other associations and organizations with which Dr. Woodley was connected are darkened and shadowed by a mortality that has marked a year long to be remembered as a sad and fateful era in the history and records of those fraternal bodies.

The "Grim Reaper" has chosen for his remorseless harvest a startling number of our most honored and esteemed associates and fellow-craftsmen, and of all who have fallen before his ruthless blade none was more beloved, none could be more keenly lamented, none was more highly distinguished for the qualities and attributes that mark and make up the "highest style of man," and we may truly and justly add that none occupied a more enviable position in the profession, which he honored and adorned, than the subject of this memorial.

Socially, Dr. Woodley was known and noted as a great-hearted, brave, and chivalrous gentleman; whose principles were above cavil or criticism, and whose impulses were all generous and noble. As a patriot and soldier he bared his bosom to the leaden hail of battle, and from first to last, with the gallant band he led, was always at his post, and between the enemy and the land he loved. Such was Dr. Woodley's skill and dash and daring as

a soldier, and so important were the services he performed that he won the recognition and approval of his great captain, Robert E. Lee, expressed in a dispatch, or order, from "Headquarters," through Col. Chas. S. Venable, of his staff, which paper is now in the hands and keeping of the family.

In the varied relations, conditions, and phases of human life it would be difficult, if not impossible, to find a character more symmetrical and well rounded than that of our departed friend.

Professionally, Dr. Woodley measured up to the requirements of the highest positions and offices in the gift of his fellow-craftsmen. Scholarly, skillful, scrupulously and thoroughly faithful in all his work, his gentle ministrations and tender sympathy with his patients won and attached to him a "clientele" perhaps as large as was ever held by a Virginia dentist. In the work of the conventions, congresses, and professional associations, Dr. Woodley was always noted for his ability, enthusiasm, and efficiency; for the broadness of his views and the soundness of his judgment. The Virginia State Dental Association owes its existence and perpetuated usefulness largely, if not wholly, to his energy and influence at a critical period in its history, and one of the grandest addresses ever delivered before a dental association was made by Dr. Woodley in the city of Richmond, when he rescued that organization from impending wreck and dissolution. And his contributions have enriched the transactions of the "Southern" and neighboring associations, notably of "North Carolina," to which he was as much devoted as to those of his own native state.

Southern dentists and Southern dentistry have sustained a great and irreparable loss in the death of this noble example of our craft and calling, a bereavement that is shared with the stricken family and wide circle of his sorrowing friends and neighbors, "For none knew him but to love him, none named him but to praise." The great outpouring of the people at his burial and the manifestations of grief and sorrow betokened the high esteem and fond affection in which he was universally held.

Dr. Woodley died, aged sixty-eight years and eight months, and had actively practiced his profession forty-three years. He leaves a widow and three children,—a son and two daughters,—to all of whom we offer our tenderest sympathy and sincere condolence, and for whom we invoke the compassion, the comfort, and the solace of "Him who holds our destinies in the hollow of his hand" and who "tempereth the wind to the shorn lamb." Another "Prince and great man has fallen in our Israel;" we shall see his face and hear his voice no more, but in our hearts his character, his example, and his memory will be cherished and embalmed while we live to worship truth, to honor virtue, and to find in noble manhood an inspiration and a joy.

W. W. H. Thackston,
Farmville, Va.

Dr. S. C. Wilkerson.

Died, at his home, in Tuscaloosa, Alabama, October 15, 1897, Dr. Sim. Cornelius Wilkerson.

On the 25th of February, 1896, Dr. Wilkerson was stricken with paralysis, from which he never entirely recovered, and was almost helpless until his death. He was born in Foster's Settlement, Tuscaloosa county, Alabama, May 11, 1839. After a course at the University of Alabama he began the

study of dentistry under the pupilage of Dr. E. H. Cogburn, in 1857, attended a course of lectures at the Baltimore College of Dental Surgery (session 1858-9), and began the practice of his profession in Tuscaloosa the following autumn. At the opening of the Civil War he was a member of the "Warrior Guards" of Tuscaloosa, with which company he was called into the Confederate service as a private. In the early part of 1861 he returned to his native county and, with three others, organized a volunteer company, of which he was elected first lieutenant, and this company formed a part of the Eighteenth Alabama Infantry. He was promoted to the rank of captain early in the war, and was captured at the battle of Missionary Ridge, after being slightly wounded. He was a prisoner of war on Johnson's Island about eighteen months, until the close of the war, when he returned to Tuscaloosa, and resumed his practice August 5, 1865, which was at once successful and lucrative. He retired in 1870 to engage in business in New Orleans, La., but again resumed his practice in Tuscaloosa in 1879, and continued there in active professional work until he retired, which he did shortly before his attack of paralysis. He was a member of the Alabama Dental Association, which body elected him a delegate to the American Dental Association and the National Dental Association sessions, which convened in Boston and New York City, respectively, in 1880, neither of which meetings he could attend. During his course of a large practice he had several dental pupils who afterward attended the Baltimore College of Dental Surgery. During the war he married Miss Nannie Bryson, an accomplished lady of Macon, Mississippi, who survives him.

Early in life he joined the Baptist Church, and continued a faithful member until his death. He was an affectionate husband, son, and brother; fond of his profession, a good and active citizen, and highly esteemed by all who knew him.

Dr. J. A. Mayer.

Dr. Mayer died suddenly, in Philadelphia, October 5, of heart-failure, while under medical treatment.

He was born in Wartenburg, Germany, July 5, 1837. He began the study of dentistry in the office of Dr. Githens, in Philadelphia, in 1856, where he continued for some time, after which he further pursued his studies with Dr. Thomas Wardle, of the same city. Having thus prepared himself, he opened an office and began the practice of dentistry in Mauch Chunk, in 1860. Later he pursued a course of study at the Pennsylvania College of Dental Surgery, from which institution he graduated in 1872.

Dr. Mayer was a highly respected practitioner, earnest in his work, and an active member of the Pennsylvania State and Lebanon Valley Dental Societies, and at times had held office in each. He was the first registered dentist in Carbon county, Pa.

He was married, in 1864, to Miss Mary Raussenberger, of Philadelphia, who survives him, with three sons, all of whom are dental practitioners, graduates of the Department of Dentistry, University of Pennsylvania.

Drs. Wm. N. Morrison and W. T. Reed.

Whereas, In the providence of Almighty God, He has seen fit to remove from our midst two of our most valued members, Dr. Wm. N. Morrison, of St. Louis, and Dr. W. T. Reed, of Macon; and

WHEREAS, The fine personal character, the high professional standing, and the strong individuality of each of these men, who have held the highest office in this society, make their loss a personal one to each of us, as well as to the profession at large; therefore, be it

Resolved, That in the death of Dr. Morrison and Dr. Reed this association has lost two valuable workers, each of us a friend, and the dental profession members whose high ideals and ability made them an honor to that profession;

Resolved, That the deepest and most heartfelt sympathy of this association is hereby extended to the bereaved families in their affliction; and

Resolved, That this expression of esteem and sympathy be placed in full upon the minutes of this society and a copy be sent to their respective families and the dental journals.

(Signed) JOHN G. HARPER,
EMMA EAMES CHASE,
G. W. TAINTER, JR.

DR. THOMAS W. EVANS.

DR. EVANS died suddenly of heart disease, in Paris, on the evening of November 14, 1897.

The position and attainments of Dr. Evans as an exponent of the possibilities of dentistry are so important that we defer the publication of a biographical sketch of this the foremost man of his calling until our next issue, in order that we may present our readers with a record of his life and character, which shall be not only full, but authentic.

PERISCOPE.

SOLDERING ALUMINUM.—A. T. Stanton points out that it is not easy to solder aluminum simply by using an alloy of definite composition without a flux, and also that the use of silver chlorid for this purpose is very troublesome indeed. Cadmium iodid, however, gives more satisfactory results, a violent evolution of iodin vapor being accompanied by the formation of an alloy of cadmium and aluminum on the surface of the metal. A further improvement is effected by mixing concentrated zinc chlorid solution with a little ammonium chlorid, evaporating in a porcelain dish, igniting at a low red heat till part of the ammonium chlorid is volatilized, then mixing the fused chlorids with cadmium iodid. The proportions of zinc chlorid and cadmium iodid must be found by experiment, and the result is a flux which enables tin, etc., to unite perfectly with aluminum. The melted flux should be dropped on the surface of the metal to be soldered, and some powdered metallic tin is also sprinkled on the surface. Then heat the aluminum over a Bunsen flame till the flux just melts, after which it can be spread where wanted with a piece of copper wire. As the temperature is further raised the flux decomposes and the tin readily alloys itself with the surface of the aluminum. Fused lead chlorid may be used instead of cadmium iodid.—*Nature,* lvi, 353.

A DENTAL ACT FOR NATAL.—The Natal legislature has passed a dental act, under which the government prosecutes. It is not necessary under this act that a man should call himself a dentist, etc.; the performance of a dental operation by an unregistered man is made penal,—six months' imprisonment or a £100 fine. Americans are excluded for the future, but L.D.S. men are accepted. There are so many dentists in the colony that, as they cannot all make a living, some of them are leaving.—*Ash's Quarterly.*

PUBLISHER'S NOTICE.

To Subscribers.

This issue completes the thirty-ninth volume of the Dental Cosmos, bringing once more the time for the renewal of the great majority of subscriptions.

We have had complaints that we failed to notify subscribers of the expiration of their subscriptions. We have no desire to offend in this way. To obviate further misunderstanding, let us explain our system of notification.

First. The printed addresses on the wrappers bear the name of the month with which the subscription expires, except when the expiration falls in December. For those subscriptions which end with December—more than nine-tenths of the entire number—there is no distinguishing mark. So that if no month is noted on the address on the wrapper of this (December) number, your subscription has run out.

Second. Inside the front cover of all expiring subscriptions we place a bill for *next year's* volume. This bill is not charged up against you. It is merely a reminder that it is time to renew.

We shall be glad to receive the renewal of every old subscriber.

Let it be clearly understood, once for all, that the Dental Cosmos is not published merely to make money. It has a far different purpose,—to make itself worthy of the highest aspirations of the profession; to be a factor in the upbuilding and advancement of the profession.

That the Dental Cosmos has been for so many years the acknowledged leader in dental journalism is because it is the mouth-piece of the thinkers in dentistry. Dentists who have a real message for their fellows come instinctively to the pages of the Dental Cosmos to address them.

Its pages are a veritable clearing-house for dental facts and ideas; an epitome of the history of dentistry; an inexhaustible storehouse from which to draw the history of past achievements; an inspiration to future advances.

We ask for the support of the profession, for the subscription of every dentist, in the full belief that not only the great body of dentists, but every individual practitioner will be benefited.

Subscription price, to United States, Canada, and Mexico, $2.50 a year, in advance; to other Universal Postal Union countries, $3.00; half a year, half price. Subscribe direct, or through your dealer.

The S. S. White Dental Mfg. Co.

HINTS, QUERIES, AND COMMENTS.

RECTIFICATION OF A CASE OF PROGNATHISM OF THE UPPER JAW ACCOMPANIED BY ANTEVERSION OF THE CORRESPONDING INCISORS.—On the 28th of October, 1894, Miss A. D. A., of Naples, aged twenty-eight, came, accompanied by her parents, to consult me about a very considerable deformity of the upper jaw. An exceptionally pronounced prognathism and a projection outward (anteversion) of the four upper incisors disfigured the face of the patient. One of my colleagues had told her that she might probably be able to obtain a modification of this disfigurement by the *redressement* of the teeth; but to my great regret I was obliged to destroy her hopes by declaring that an operation of that nature was not practicable.

It was a case of osseous exuberance, with an exaggerated surface of the alveolar processes, in consequence of which the extremities of the four upper incisors, especially the centrals, were separated from the lower incisors by a space of more than two centimeters, so that when the patient closed her mouth not only the teeth but also a portion of the gum remained uncovered. This unfortunate young lady had never known what it was to close her lips, and her profile was monstrous.

I told her that the deformity could, at least partially, if not totally, be rectified by the removal of the four protruding incisors, and that after the cicatrization of the gum artificial incisors could be placed in their anatomical positions. Both parents and patient accepted my proposition, and begged me to perform the operation at their house. The following day I went there, having modified my primitive intention. A new idea in dentistry had occurred to me in reference to this special case.

After having prepared everything for the operation,—narcosis and scrupulous antisepsis,—I administered chloroform to the patient and extracted the four incisors; then with a bistoury I detached the entire gingival edge from their respective alveoli, commencing from the left cuspid to the right; folding back this flap, I removed, by means of a small saw, an osteotome, and a file, all the external alveolar edge and also a portion of the internal alveolar edge in the middle. Having with sublimate spray cleansed the part from the slightest detritus or clots of blood, I re-applied the anterior gingival flap, and as toward the center it was slightly exuberant, I cut off the superfluous portion and with sutures fixed it to the palatal flap.

The patient was still sleeping when the operation was finished, but on awakening her first movement was to put her hand to her mouth and to ask for a looking-glass. On seeing for the first time her lips closed and the deformity removed, she was seized with a kind of convulsive laughter, caused by surprise and joy, for in spite of the absence of the four incisors the face had acquired a presentable appearance.

An antiseptic and astringent mouth-wash, to be used frequently, was prescribed, and the following day I found that everything had proceeded most satisfactorily. My patient declared that she had not suffered in the least, either during or after the operation, and expressed herself as very grateful. On the fourth day the wound was healed by first intention, and the sutures were removed. At the expiration of thirty-two days the gums were perfectly firm and in their normal physiological state. An impression of the parts was taken, and three days after the young lady had the satisfaction of smiling and displaying a beautiful, equal, and unicolored set of teeth.

The necks of the four artificial incisors formed a slight margin at the edge of the gum, and one could have sworn that these teeth were implanted in their respective alveoli.—V. GUERINI, Naples, Italy.

DR. J. ROMAINE RICKER, of Beaumont, Tex., sends to us a supernumerary tooth of the typical conoidal crown form, which was taken from the mouth of a boy seven years of age. "The tooth was fully erupted, and the mother of the boy stated that at the age of five years a similar tooth was taken from his mouth on the opposite side. The tooth in question was removed from the left side, near the palatine ridge." The appearance of supernumerary teeth fully erupted at so early an age we believe to be rather unusual. If other members of the profession have made similar observations regarding the early eruption of supernumerary teeth we shall be glad to receive them as a matter of record.—(*Ed.* DENTAL COSMOS.)

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The illustration of the Whitney specimen in the July COSMOS shows a very common condition. Thousands of roots of teeth must be annually extracted showing just this condition, with decomposed material in the root-canals and a deposit on the root-end in an abscess cavity, even where there is no apparent inflammatory condition. Often this deposit has to be removed, after root-filling, either by burring or acids (with or without the aid of the electric current), before the abscess or fistula will heal. As such deposits cannot be salivary, they must be inflammatory products.—F. A. ROY.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—Please allow me to submit to the dental profession, through your column of Hints and Queries, the three following hints to workers in gold:

When I need a small piece of gold wire for pins in removable bridge-work, etc., and am not situated where I can readily procure just what I want without delay, the amount being too small to run into an ingot without a great deal of trouble, I proceed as follows: I take a piece of 22k. plate and cut it into strips, wide enough to allow of its being hammered and shaped for the draw-plate afterwards. I then place the strips side to side, and bind them together with a small piece of iron wire to hold them in place. Place the strips with their edges upward in one of the grooves of Dr. Melotte's soldering-block, paint with borax water, and put a small piece of 20k. solder on each end and one in the middle, taking care that the solder does not touch the iron wire, then solder with the blow-pipe; take the iron wire off, and solder all along the piece, turn it over and solder the other side, taking care to use as little solder as possible, then boil it in water with a few drops of sulfuric acid, to clean it, and remove the borax (a common tea cup will do to boil it in), hammer it into a round shape, anneal it and draw it through a draw-plate to the desired thickness. It must be annealed occasionally while being drawn, except for the last two holes. By drawing through the last two holes without annealing, the wire is hardened and tempered. A piece of gold worked this way is not so brittle as it would be by casting it into a small ingot, and it will be found to work easy and tough.

Sometimes we have a quantity of gold filings which we want to melt, but have trouble to make the grains unite, as they have a tendency to decrepitate; that is, to fly away, and also to ball up without uniting. I take

my filings and pass a magnet through them to remove any particles of iron, then rub up a little borax with water on a piece of slate (using very little borax), and work up the filings into a pasty mass, and place on top of some gold scraps, or alone, on a Melotte crucible, and melt with the blow-pipe, or if the quantity is too much for the blow-pipe, I put the pasty mass into a furnace crucible and melt in the furnace; this way I melt all my filings. I generally use the blow-pipe and Dr. Melotte's soldering-block with the small crucible, and have no trouble in melting when the quantity is about half an ounce or less.

When working on a fusible alloy die, there will always be danger of getting a little of the alloy in the filings and small scraps. Such, of course, if melted up with the gold, will make it very brittle and give a great deal of trouble in rolling and working the gold afterwards. In order to obviate such annoyance, I boil all suspicious filings and small scraps in three parts of hydrochloric acid and one part of water for about fifteen minutes, then wash well with water to remove the tin, etc., that is now in solution.

Hoping the above hints will be of service to many crown- and bridge-workers in the profession, I am, very respectfully,

J. S. McDonald, Durango, Mexico.

Improvement in Methods of Retaining Artificial Dentures in the Mouth and the Elimination of the Irritations Caused by Vulcanite Plates.—Many attempts have been made to provide a soft or elastic base for hard rubber plates, in order both to render them adhesive and to prevent the inflammation which usually arises from wearing vulcanite plates.

It has been found, however, that these soft rubber linings disintegrate, leaving the denture practically worthless.

Having thoroughly tried all methods that have come under my observation, I can unhesitatingly say the adhesive plates, following the method here described, will produce unquestionably satisfactory results.

The method is as follows:

After securing an accurate plaster cast, it is coated with rubber cement,—*i.e.*, sheet rubber cut in small pieces and dissolved in chloroform. (The rubber cement supplied by the S. S. White Dental Mfg. Co. is excellent for this purpose.) Then, after removing the tin-foil, slightly warm the adhesive plate and press it closely with thumb and fingers around the cast, allowing the adhesive plate to cover the whole palatal surface as well as the alveolar ridge. It is then trimmed with a hot knife and given a coating of the rubber cement. A sheet of rubber, either red or black, follows this, covering the same surface and being pressed closely to the cast as before, the surplus being trimmed with a hot knife. The cast in this condition is now placed upon a piece of paper and covered entirely with plaster; after the plaster has set, bind with wire and place in the vulcanizer.

This plate is to be vulcanized forty-five minutes at 320°. An empty flask, or half flask, should be placed in the vulcanizer upon which the plaster investment is allowed to rest, as the water should not reach it.

This will produce the base-plate with the adhesive plate attached and incorporated with the rubber. It will be found to be soft and flexible, and to impart a soothing sensation to the mucous membrane of the mouth. The base-plate is now tried in the mouth, and trimmed to accommodate the muscles, and used for getting the bite, being waxed up in the usual man-

ner. After obtaining the bite the teeth are placed upon the plate with wax and again tried in the mouth. The case is now flasked in the usual way; however, when the wax is boiled out, a coating of rubber cement is applied to the alveolar ridge to insure adhesion of the rubber. The usual method is now followed, the case being vulcanized one hour at 320°. When the case is taken from the vulcanizer, the adhesive plate will be covered to some extent with rubber cement; however, this will disappear when worn a short while. The forty-five minutes consumed in vulcanizing the base-plate is more than compensated for by the time usually spent in waxing up, finishing, etc.

By the method described a plate is produced of uniform thickness, and one which is much lighter than the usual denture.—Ralfe M. Harlan, D.D.S., New York City.

Cataphoresis in the Treatment of Pyorrhea Alveolaris.—Whatever medicines give satisfaction in the treatment of pyorrhea alveolaris *without* the aid of cataphoresis will give far greater satisfaction *with* it. Of course, powerful medicines which will destroy soft tissue should not be used, but the object being to destroy all germs and to stimulate the broken-down tissues to repair, we are supplied by cataphoresis with a means which is exactly what is needed.

To be able to completely diffuse into every part of the affected tissue and its surroundings medicines which we know will destroy microbes of all kinds, if thoroughly applied to them, is what dentists have been trying to find for a long time. The want of proper cathodes adaptable to the treatment of pyorrhea has, of course, been a stumbling-block in the way of those who might like to use electro-medicamental diffusion, but it is an easy matter to have these made; the set I use has been made to order by the Flint Edge Gold Alloy Company, and I shall be pleased to give anyone all the information they may want about this set of instruments, so well adapted to the treatment of pyorrhea. They consist simply of four platinum points, flattened and round and bent at useful angles for going around the necks of the teeth and also between them. The principle of this method of treatment must recommend itself to every one. We are all well acquainted with the disease and the difference of opinion as to how it should be treated, and whether it is curable or incurable, but, for the purpose of introducing cataphoresis as a new method of treatment with a new set of electrodes at our disposal, let us go through one method of treatment which has been found very efficacious, and which, while not claiming to be the *only* method or the best, has proved itself to be most effective. It will not be necessary to go minutely into everything, simply a curtailed description of the treatment of a case of pyorrhea alveolaris by cataphoresis:

Remove all calcareous deposits around the teeth and under the gum; syringe out the pockets with a weak antiseptic solution; pass a fine nerve-broach wrapped with cotton wool under the gum around each tooth, wiping out the pockets with the following:

℞—Carbolic acid, min. xx;
Iodoform, grs. ii;
Euthymol, min. v.
M.

Rinse out with warm water to prevent burning; with a napkin in the mouth, surrounding about six teeth at a time, make them dry, apply the antiseptic solution with which you intend to destroy the germs on shreds of cotton wool wrapped loosely around the teeth and going up into the pockets; the battery being ready, with a selected electrode begin cataphoresis, using the minimum number of cells, and gradually increase the current until slight sensation is felt by patient; keep the current at this strength so that the patient feels nothing if you remove the electrode and replace it; the electrode is passed up under the gum to the bottom of the pockets and moved all around the loosened tooth on every side; the cotton is kept saturated with the solution, a very useful one being:

℞—Euthymol, min. xxx;
Iodin, min. iii.
M.

or, ℞—Euthymol, min. xxx;
Sanitas oil, min. v;
Iodin, min. ii.
M.

or, ℞—Borin, min. xxx;
Aconite root,
Iodin, āā, min. ii.
M.

The current is kept on for about twenty minutes on six teeth, during which time a great deal of the solution will be found to have been absorbed. On removing the current and cotton, the pockets are once more wiped out with a fine nerve-broach wrapped with cotton wool, steeped in some astringent, and finally the gums around the teeth are painted with a mixture of

℞—Aconite root,
Iodin, āā, *part. æq.*
M.

Several sittings are required after the first one, when cataphoresis is again performed and the case watched.

A trial of this method of treatment is sure to convince any one of its advantages over simply applying medicine without the aid of cataphoresis. —Ernest Sturridge, London, Eng.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING OCTOBER, 1897.

October 5.—No. 591,338, to F. F. Fortney and T. H. Stevens. Dental chin-rest.
" *12.*—No. 591,499, to Percy Russell. Electric dental mallet.
" *19.*—No. 592,002, to A. M. Denham. Head-rest.

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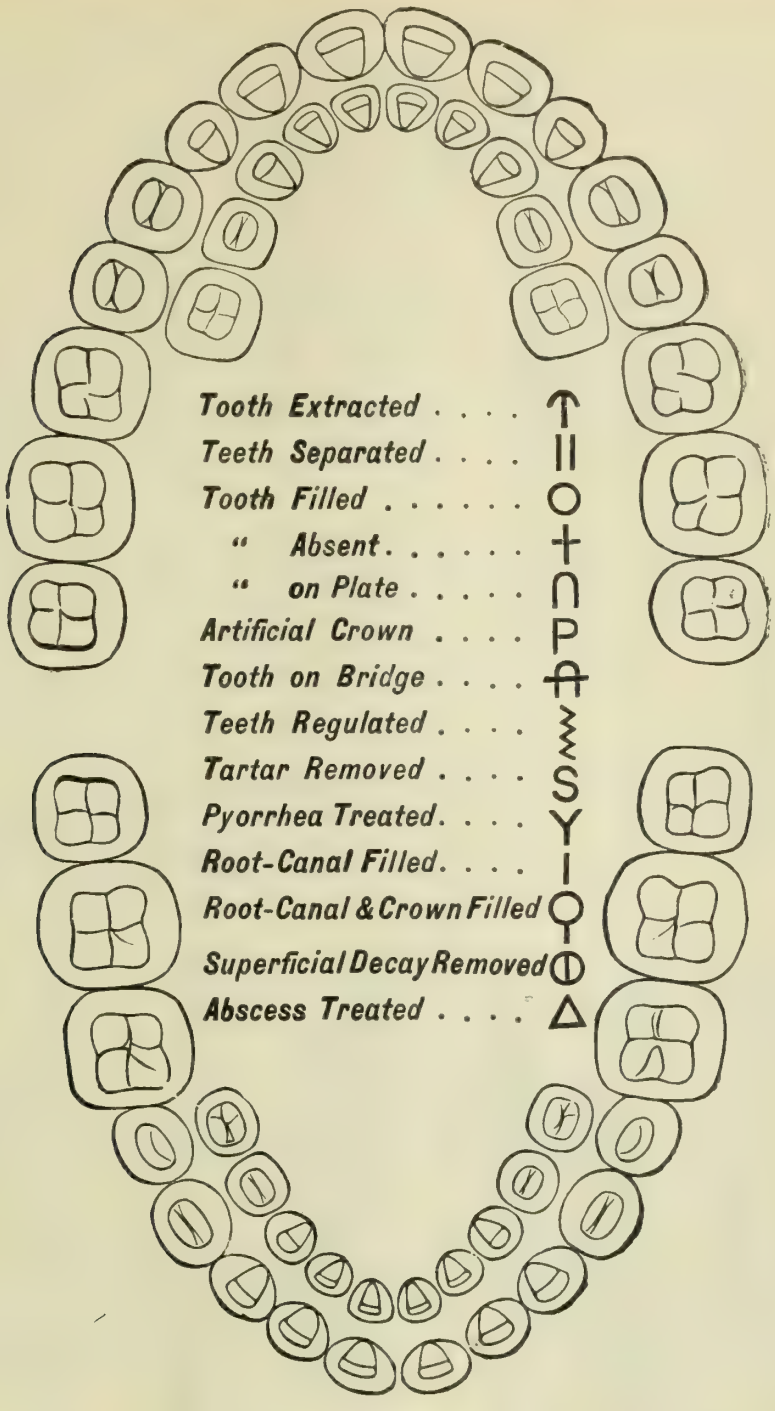
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Two accounts to the page, each with diagram as shown with place for name, reference, date of operation, charges, and credit for amounts paid.

Good paper, substantially bound, with ample index. In stock regularly as priced below.

Larger books (more pages) made to order at moderate prices.

PRICES.

340 Pages,	Half Turkey,	Cloth Sides	. . . . .			$3.50
340 "	"	Roan, Paper	"			3.00
172 "	"	"	"	"	. . . . .	2.00



Mr. John Doe

1769 Easy St.

Recommended by Mr. Richard Roe.

1895		No.	Gold Filling.	Amalgam Filling.	Phos. Zinc Filling.	Gutta Percha Filling.	Tin Filling.	Artificial Crown.	Bridge.	Treatment.	Cleaning Teeth.	Extraction.	Artificial Denture.	Time Reserved.	Dr.		Cr.		MEMORANDA.
Feb.	20	1	✓												7	50			
"	"	2	✓												5	00			
"	21	3			✓										2	50			Pulp capped with Asbestos
"	"	4		✓											2	50			
"	"	5				✓		'							2	50			
"	23	6						✓							20	00			Richmond Crown - two pins.
March	3																40	00	
															$40	00	$40	00	

THE WARREN IMPROVED DENTAL LEDGER.

One of the most important features in the Warren Dental Ledger is the diagram, admittedly the best ever offered.

The headings cover all the usual operations, and an ample column offers opportunity for making special notes.

308 pages, each 10 x 15 inches, 88 of which have three diagrams each, 132 have two, and 88 have one each, thus affording opportunity for long, medium, and short accounts.

The method of keeping an account (demonstrated on opposite page) is to number the operations consecutively, placing the same number on the tooth treated, then the date, number, and amount, with a check-mark under the heading which designates the operation.

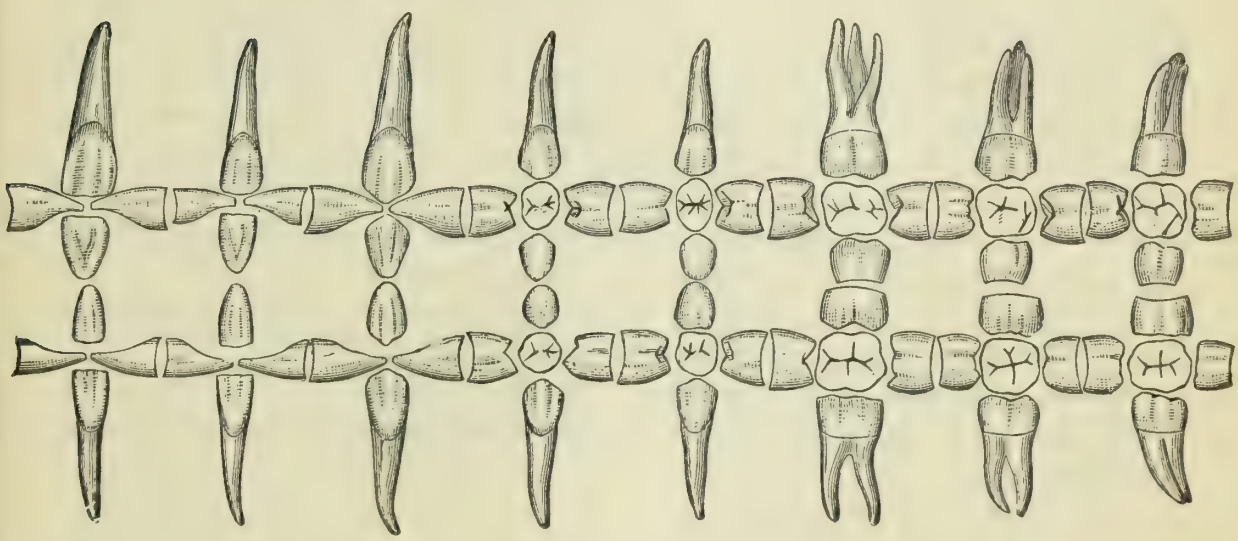
Supplied with an ample index, and strongly bound, with back and corners half Turkey morocco.

Price $3.50

We can supply Warren Dental Ledgers, made to suit special needs on order. Thus, if one wishes to have a book composed entirely of one account or two accounts or three accounts to the page, or omitting any one of the sizes, we will be glad to quote special prices.

AINSWORTH'S DENTAL LEDGER.

Devised by Dr. Geo C. Ainsworth.



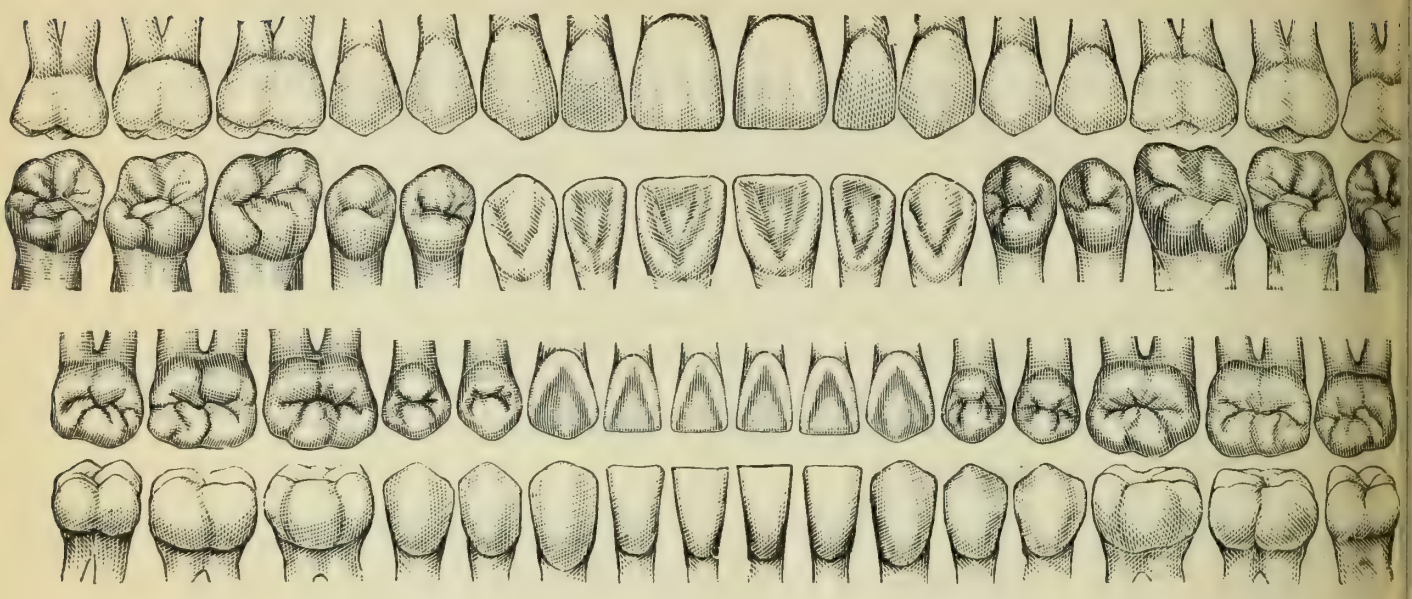
The diagram which Dr. Ainsworth uses (of which one side—the left—is shown) permits an operation on any portion of any crown to be so plainly indicated that there can be no mistaking its exact location. The pages are 9¼ x 11½ inches, made up into books of 200 and 396 pages. The smaller books are bound in half Russia, cloth sides; the larger are full bound, with Russia corners,—regular ledger binding.

A proportionate number of the pages in each style is ruled for one, two, and three accounts to the page, each account having a separate diagram. The index is interleaved with blotter.

PRICES.

Half Russia, 200 pp.	$3.50
Full bound, 396 pp.	6.50

ALLAN'S EXAMINATION RECORD.



If you use the Warren Improved Dental Ledger, the kind of Examination Blank you will want will depend on circumstances. If you want the blank simply as a memorandum, you will use the No. 3 Blank (see page 9; but if you want to keep the Record of the Examination where you can refer to it in a moment, you will use the Examination Record as devised by Dr. Chas. F. Allan. In this Record the diagram shown above is printed on leaves (one side only) 5¾ x 7½ inches. At the bottom of each leaf are blanks for the name of patient and date of examination, the space intervening being used for such memoranda as may be required. The leaves are bound in oblong books containing 100 each, on the front cover of which is the imprint "Examinations. From ..... to ....."

Keeping these accessible, the dentist has only to refer to his ledger to get the date of any examination made; then turn to the "Examinations," and it is but a moment's search to find the one wanted.

The diagram is the most complete in its exposition of the various surfaces of the teeth that has yet been brought forward.

Price, per book of 100 Diagrams, 5¾ x 7½ inches . . $0.30

We have also the books with the leaves numbered, and four ruled pages for indexing.

Price, Indexed and Paged $0.40

WATERS'S DENTAL LEDGER.

Arranged for keeping a minute account of all dental operations, and enabling the dentist to preserve in a condensed form, memoranda which can be referred to by means of the index.

Price, 101 pages $3.50
" 201 " 6.50

Brooks's Dental Laboratory Register and Ledger.

280 pages, Half Russia.

Price $3.00

GRIFFITH'S

Appointment Book and Emergency Compendium.

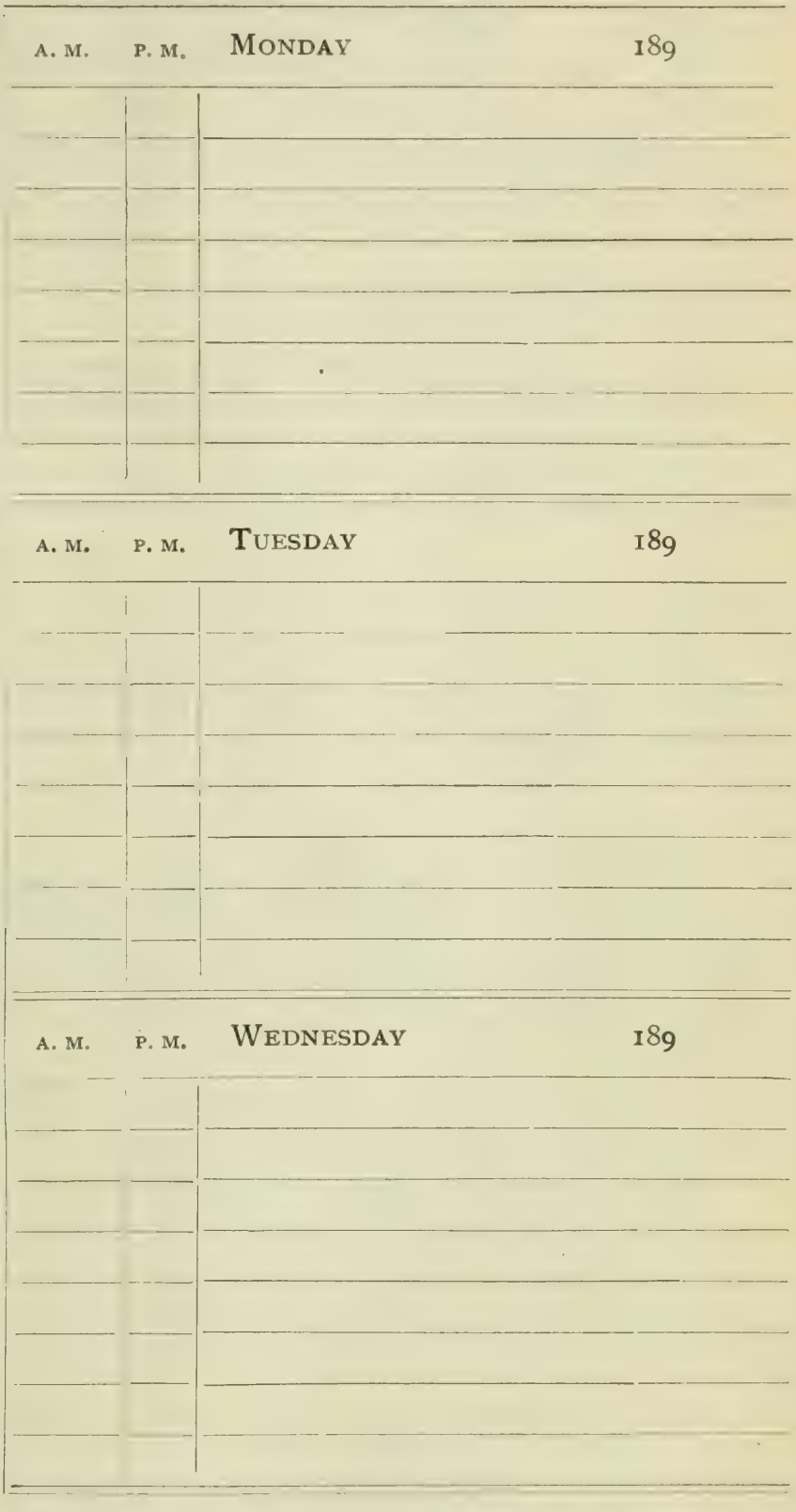
By J. F. GRIFFITH, D.D.S.

The Griffith Appointment Book and Emergency Compendium has three functions, all related; it discharges all three well.

First is its purpose as an Appointment Book. The left-hand pages, as the book is opened, are ruled eight appointments for operations each day, three days appearing on each page; hours for forenoon and afternoon in separate columns, appointments for fifty-five weeks.

The second use is as a memorandum or daily reminder. The right-hand pages are ruled for this purpose, and afford ample room for noting any memoranda of supplies or appliances needed for any of the operations appointed.

The third feature is the collection of twenty-three pages of useful hints for application in daily practice, instructions for emergencies, list of poisons and their antidotes, dosage tables, etc.



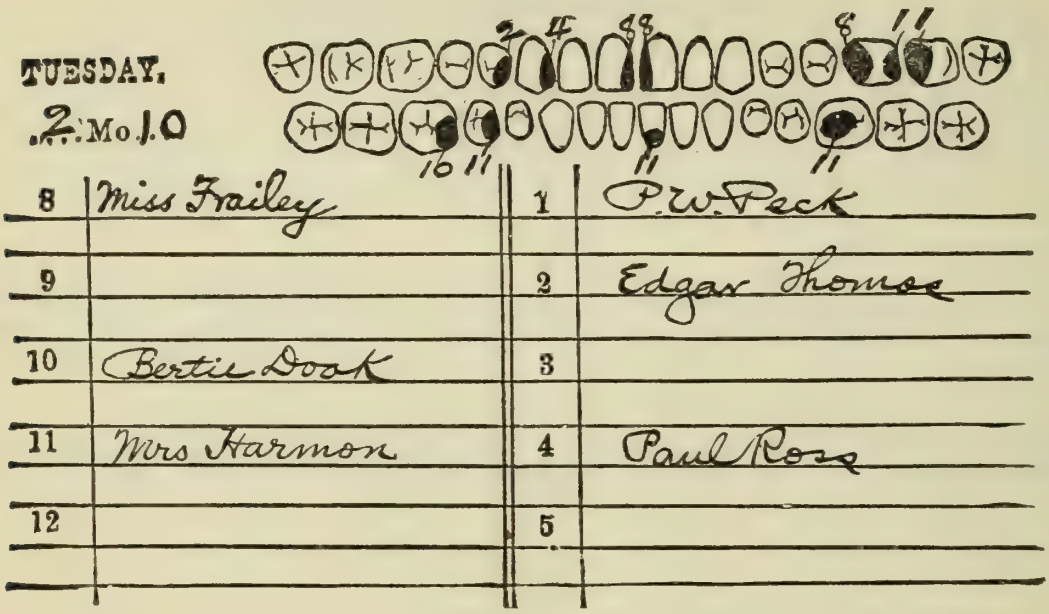
Neatly bound in leather, with aluminum stamp and gilt edges. Two styles, plain, and with fold-over flap, pocket, and pencil-holder.

Size 6 x 3¼ inches. Without date, and good for any time.

PRICES.

Leather, plain	$1.00
Leather, with flap, pocket, and pencil-holder	1.25

THE DIAGRAM APPOINTMENT BOOK.



The feature of this Appointment Book is the facility which it affords of making a brief but clear memorandum of the work to be done for each patient at the time the appointment is made.

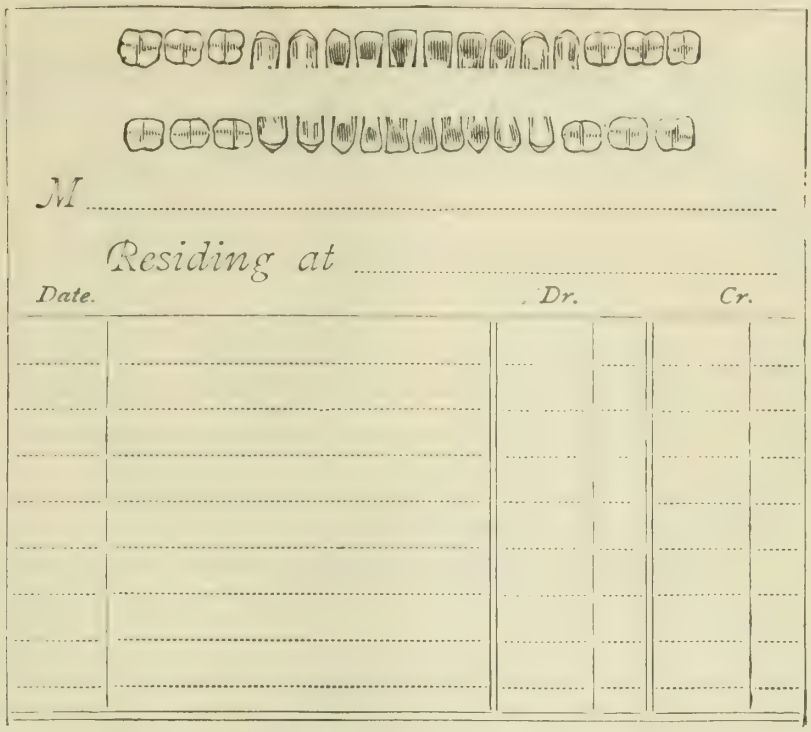
For each day there is a diagram of the teeth. As appointments are made, the hour set apart is noted upon the diagram, opposite the tooth or teeth to be treated. When the patient takes his place in the chair, a glance at the diagram shows the operator at once where the work is to begin.

The illustration shows a typical day's markings.

The book is 6¾ x 4¼ inches. In the front are calendars for three years, and a table showing the number of days from any day in one month to the same day in any other month; following this are the appointment pages, a full week's appointments being shown when the book is opened. Back of this are pages for memoranda and blanks for a monthly cash account and yearly summary. Supplied in cloth or leather.

PRICES { Cloth $0.50
Leather 75

The Meredith Pocket Dental Account Books.



Here is a complete line of account books, Register, Journal, and Ledger, for the dentist, of proper size to be carried in the pocket. The example shown is a blank for one of the medium accounts, as used in the Register and Ledger. The diagram of the teeth is the same in all the books of the series, but a special diagram of the temporary teeth is supplied for recording operations upon them. Each of the books is intended for use for making appointments, having pages set apart for that purpose.

The three books are described as follows:

The Pocket Dental Register and Appointment Book

contains 219 pages, divided as follows: 57 folios (double pages) for small accounts, ten to the folio, each supplied with a diagram for locating operations; 24 pages for medium accounts, two to the page; 16 pages for larger accounts, one to the page; 8 folios with ten accounts to the page for operations on the temporary teeth; 32 pages for appointments, twelve days to the page (sixty-four weeks), good for any time, and 16 pages for index and memoranda.

For dentists of small practice this book supplies all the requirements.

The Pocket Dental Journal and Appointment Book,

designed for use as the day-book and journal of the merchant are, for recording the operations of the day as they are completed, which are afterward to be posted to a ledger. There are 85 folios with ten blanks to the folio; 4 folios for operations on temporary teeth; 32 pages for appointments, and 8 pages for memoranda. It may be used in connection with any of our dental ledgers, or with

The Pocket Dental Ledger and Appointment Book,

made up principally of the large and medium blanks used in the Register, and therefore to be used more especially as a Ledger or condensed statement of the work recorded in the "Journal." It has 91 pages for medium accounts, two to the page; 72 pages for large accounts, one to the page; 8 pages for operations on temporary teeth; 32 pages for appointments, and an ample index and pages for memoranda.

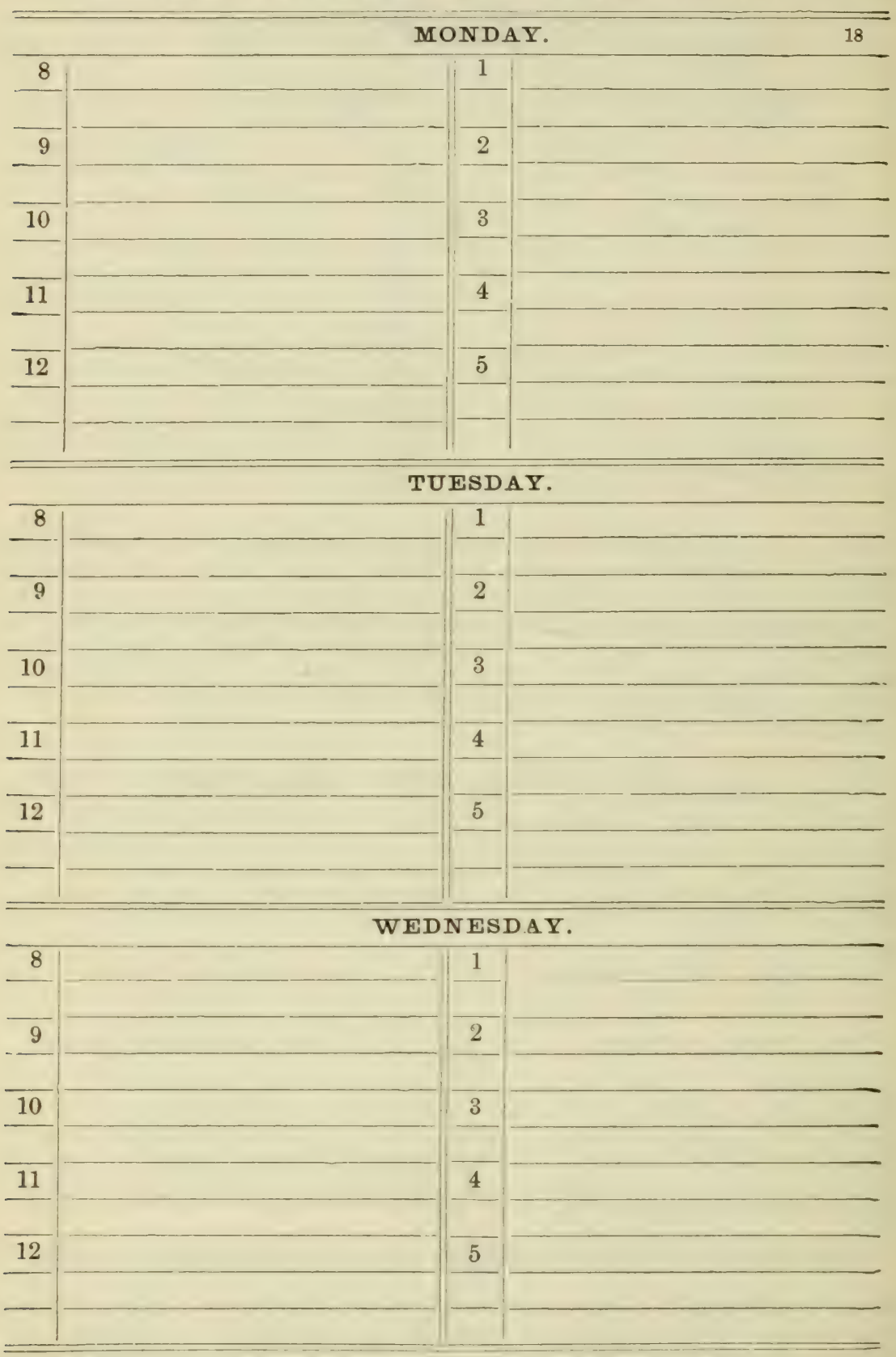
Prices uniform for all the above.

Cloth	$1.25
Leather, with Tuck	1.50

Dentists' Pocket Diary and Appointment Book,

FOR

REGISTERING APPOINTMENTS FOR DENTAL OPERATIONS.



The Diagram shows the exact size and style of a page of the Pocket Diary, presenting, when open, engagements for one week. The figures denote the hour of the engagement. It contains blanks for 54 weeks, and, being without date, is good for any time. It has also a neat memorandum attached.

Flexible Cover, Gilt Edge $0.75
" " " " with Pocket and Tuck . . 1.00

MEMORANDUM BLANKS, No. 1.



The size and style are shown by the diagram. Plain backs. Size 4⅝ x 2⅜ inches. 100 in a tablet.

Price . . . . . per tablet $0.20

EXAMINATION BLANKS, No. 3.

*Date,*_____ *189*



*Examination of M*_____

teeth.

*Remarks :*_____

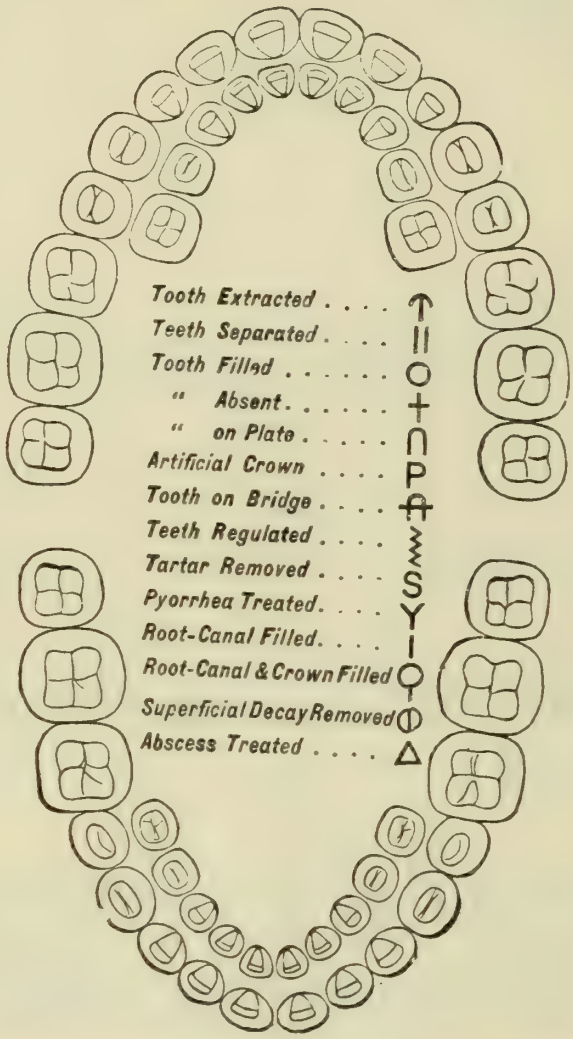
The illustration of the teeth used in the No. 3 Examination Blanks is a reduced fac-simile of that in the Improved Warren Dental Ledger. The outlines show the size and style of the blank. Size 3¾ x 3¾ inches.

Put up in tablets of 50. Each blank readily detached without interfering with the others.

Price . . . . . per tablet $0.20

EXAMINATION BLANKS, No. 2.

EXAMINATION.



.....

.....

.....18

The diagram is a reduction of that used in the Improved Allport Dental Ledger, showing the symbols used to facilitate rapid book-keeping. The reverse side is made up in the form of a memorandum account, whereon any desired entries can be made to be afterward transferred to the Ledger.

Size 5⅜ x 3¾ inches. Put up in tablets of 50 each.

Price . . . . . per tablet $0.20

LYNTON CEMENT.

The manufacturer of this Cement, Mr. Siegmund Pappenheim, says, "Rostaing's crystallized cement-filling 'dentinagene' marked an epoch in dentistry. But, when the inventor died, the secret of his cement died with him, and all subsequent attempts to recover it proved in vain.

"It is only very lately, and after the most searching chemical investigation of some of the best of Rostaing's cement, that this admirable filling has at last been resuscitated in the shape of LYNTON CEMENT.

"LYNTON CEMENT is identical in its chemical and physical qualities with Rostaing's best material, over which it possesses this great advantage, that its quality never varies. Rostaing's cement was not uniform in quality; he lacked the scientific basis on which to build an exact method of manufacture.

"A scientific formula regulates the chemical composition of LYNTON CEMENT as well as the process of its production, and the personal supervision of a technical expert guarantees nicety of execution.

"A number of distinguished dentists have made use of LYNTON CEMENT in their practice, and have expressed themselves in terms of the highest satisfaction as to its admirable qualities.

"The fact that LYNTON CEMENT—like Rostaing's dentinagene—undergoes a minimal expansion while hardening, ensures absolute tightness and adherence to the cavity. This is an advantage which LYNTON has over some other cements that contract while hardening.

"LYNTON CEMENT does not stick to the instruments and the fingers, but it adheres closely to the dentine."

LYNTON CEMENT is made in 12 colors:

No. 1. White.	No. 7. Blue White.
" 2. Yellow White.	" 8. Light Gray.
" 3. Light Yellow.	" 9. Pearl Gray.
" 4. Yellow.	" 10. Gray.
" 5. Gold Yellow.	" 11. Greenish Gray.
" 6. Brown.	" 12. Blue Gray.

Put up one color in a case. Two sizes of packages.

PRICE.

Large Size	per case $2.50
Small "	" " 1.00

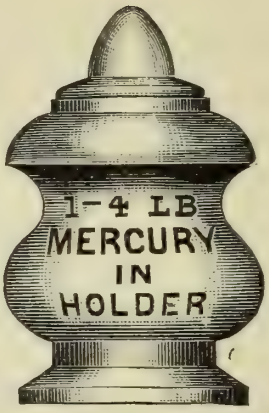
THE S. S. WHITE DENTAL MFG. CO.,

Sole agent for the United States, Canada, and South America.

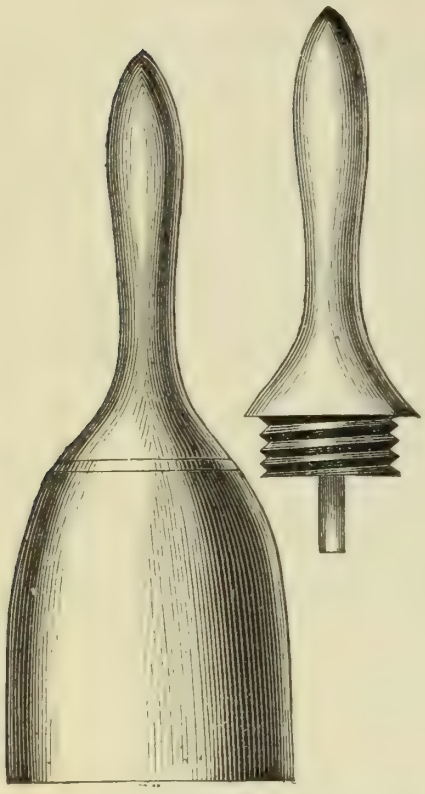
MERCURY AND MERCURY-HOLDERS.



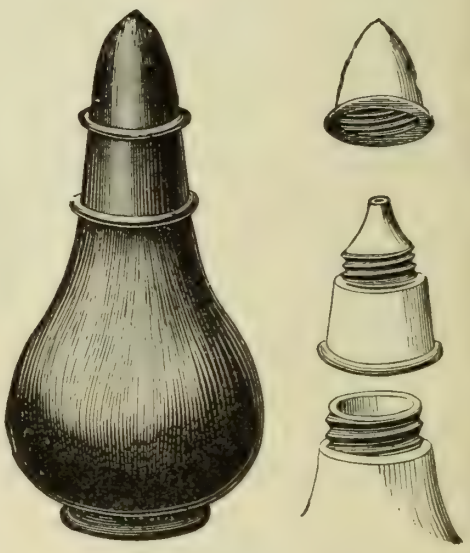
¼ Pound in Bottle.



¼ Pound in Wood Holder.



No. 1.



No. 2.

The Mercury which we sell is of the best quality. It is prepared specially for us by a responsible, reliable manufacturing chemist. Sold in ¼-lb. bottles or in the wood holder.

Price, ¼ lb. in bottle or holder $0.50

Those who want a special Mercury-Holder will find either No. 1 or No. 2 to be a satisfactory appliance.

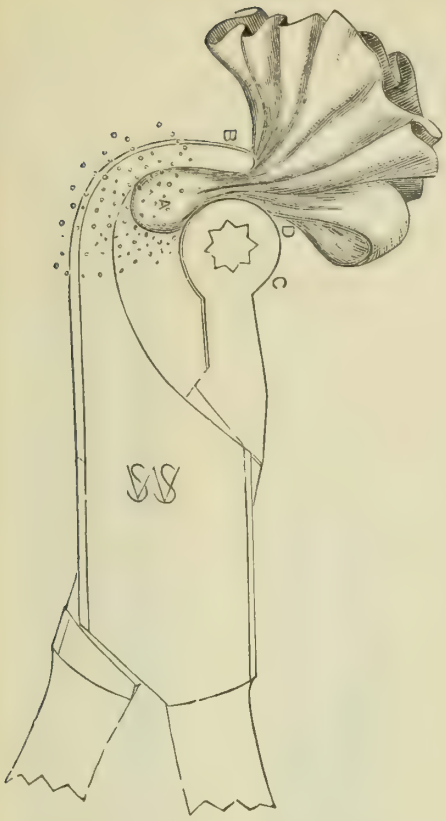
No. 1. Made of hard wood. A small opening through the tube allows the mercury to escape in a very fine stream. A plug at the lower end of the tube prevents its escape when not in use.

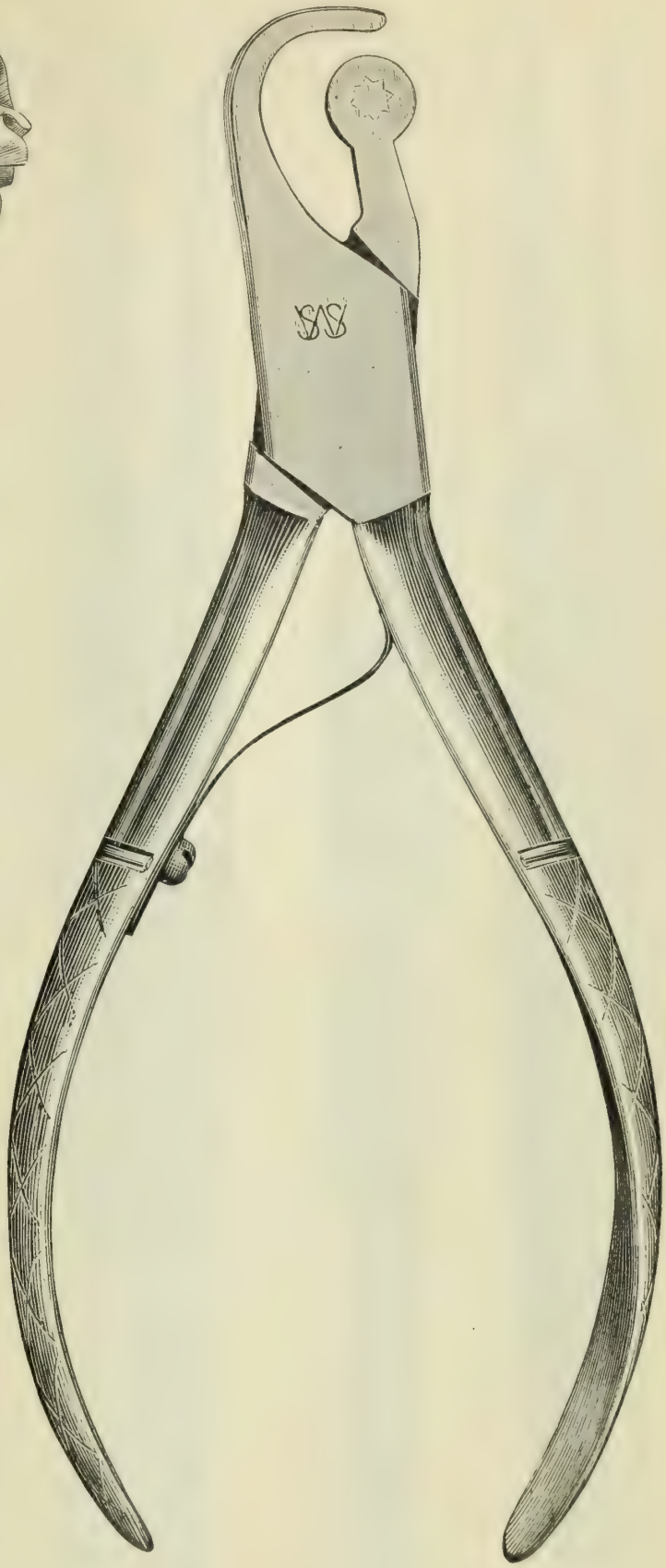
No. 2. Made in ebony and boxwood. It has a double screw-cap. Both sections are removed to fill the holder, the outer one only, to use the Mercury. The outer cap effectually closes the small opening when not in use.

No. 1, empty . $0.25; filled with 2 ozs. Mercury . $0.50

" 2, " . .50; " " 2 " " . .75

MERCURY EXPRESSER.



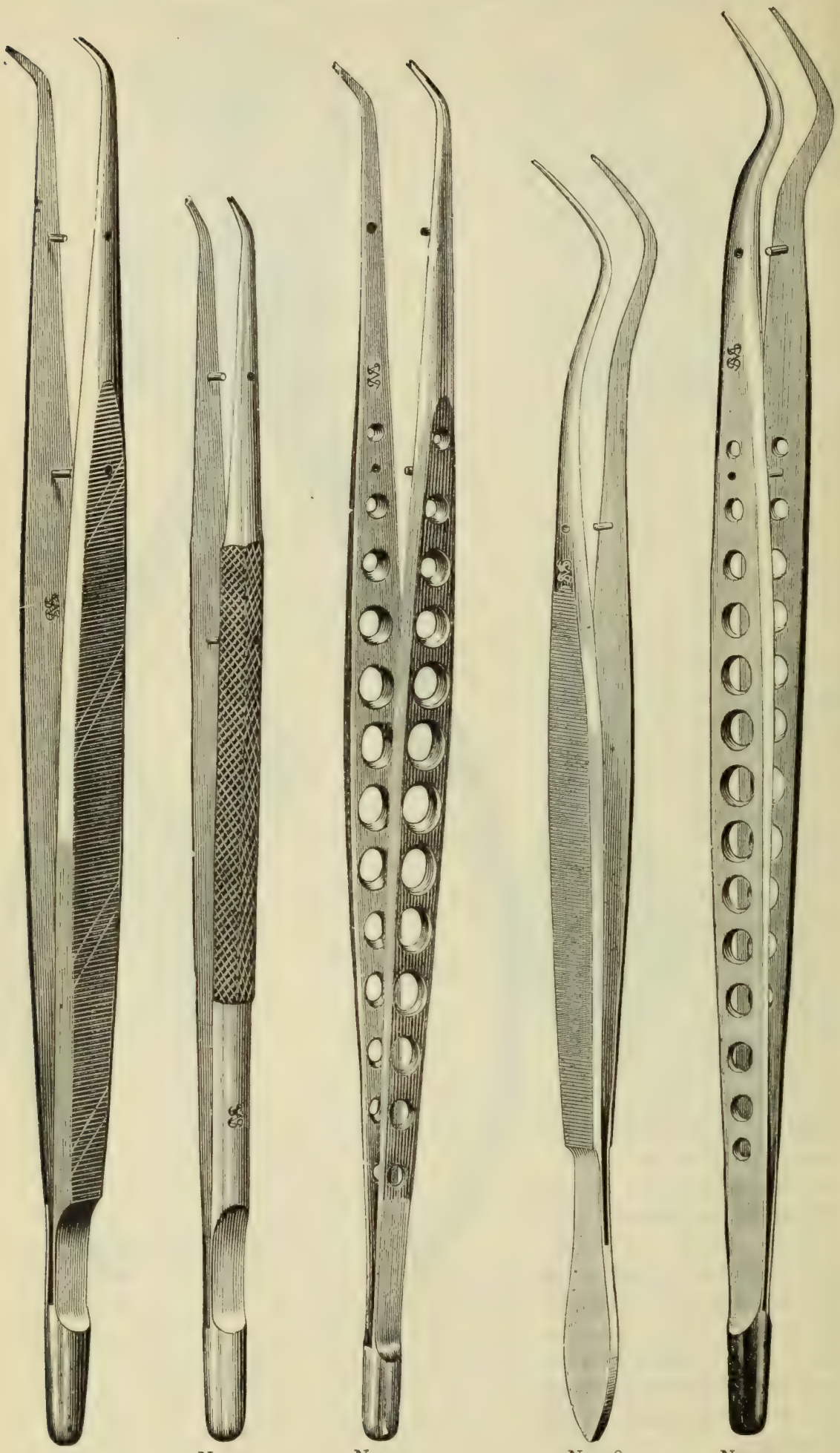


How best to get the surplus mercury out of amalgam pellets is solved by this appliance: The amalgam is put in a piece of chamois, and the chamois sack A is entered between the beaks B and C (the latter a roller), when closing the handles of the instrument progressively squeezes out the mercury till any desired degree of dryness is attained. When the amalgam is squeezed to the requirements of the operator, the handles are released, when the spring opens the appliance.

The action is simple and sure, and is analogous to the finger and thumb movement in common use, but much more powerful and therefore more certain and more uniform.

Price . . $3.50

Foil-Carriers and Pluggers Combined.



No. 1.

Flat Handle.

Nickel-plated, $2.00.

No. 2.

Octagon Handle.

Nickel-plated, $1.75.

No. 3.

Dr. Rich's.

Nickel-plated, $2.50.

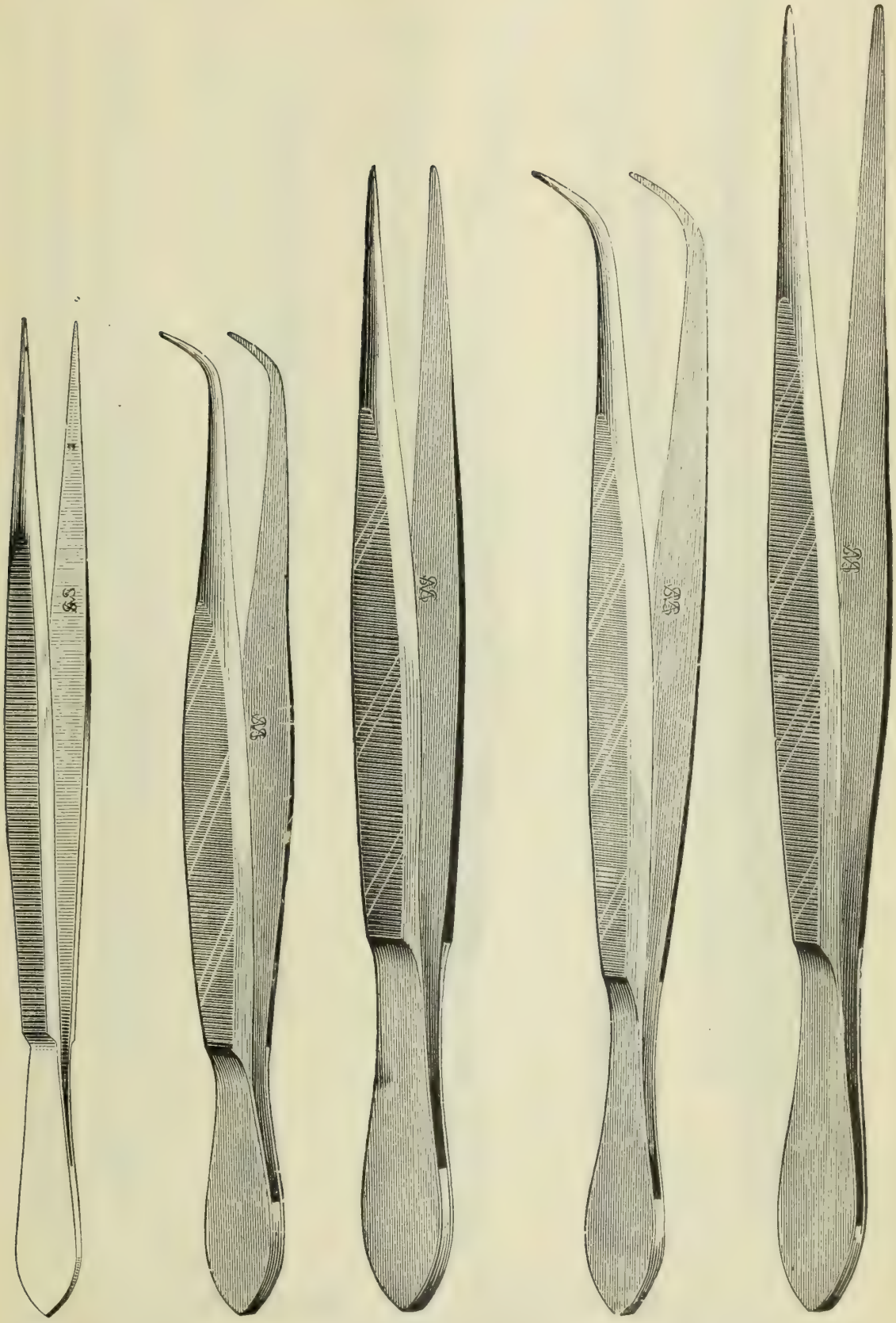
No. 18. No. 19.

Dr. Meriam's Long-Reach Foil-Carriers and Pluggers Combined.

No. 18, Nickel-plated . $1.25
No. 19, " . 2.75

PLUG PLIERS.

(CUTS FULL SIZE.)



No. 5.
4½ in.
Straight.

No. 6.
4½ in.
Curved.

Nickel-plated, $0.60.

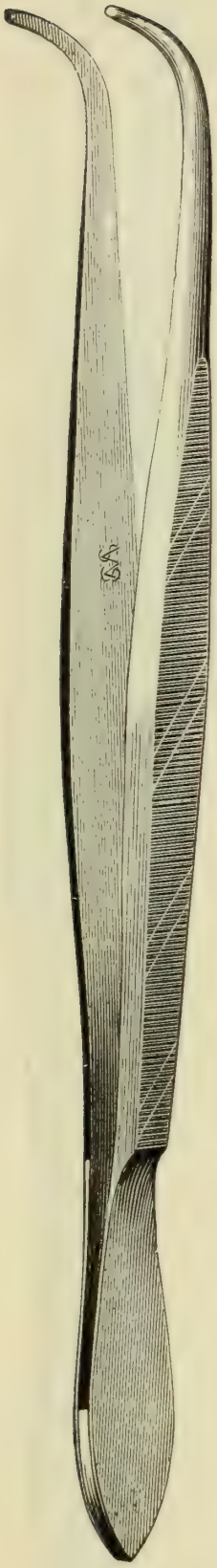
No. 7.
5¼ in.
Straight.

No. 8.
5¼ in.
Curved.

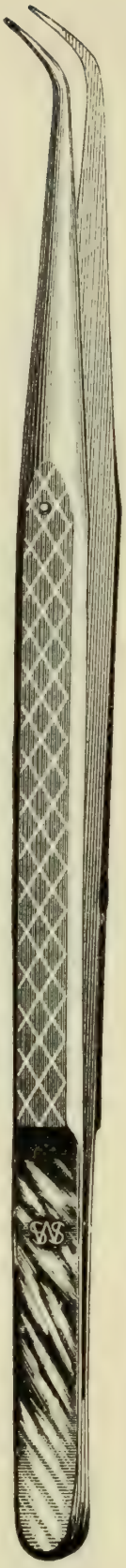
No 9.
6 in.
Straight.

Nickel-plated, $1.00.

PLUG PLIERS.



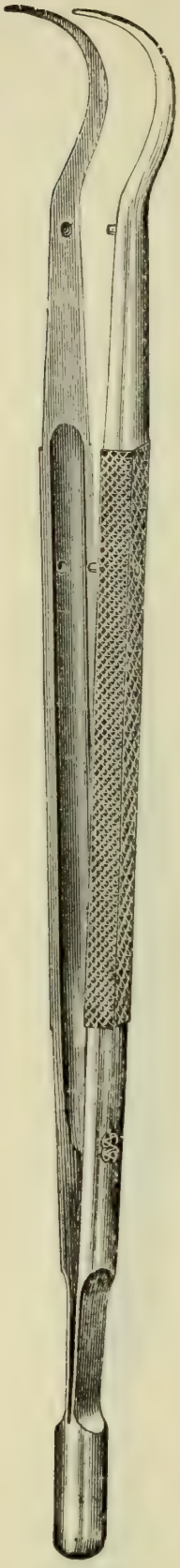
No. 10.
6 in.
Curved.
Nickel-plated.
$1.00.



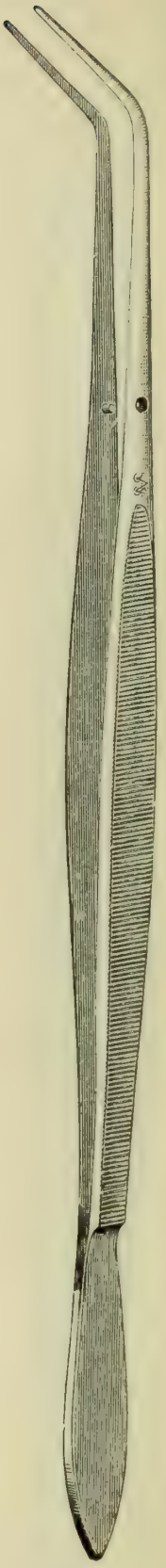
No. 11.
College Pliers,
Nickel-plated.
$1.00.



No. 12.
DR. PERRY'S
Anneal'g Pliers.
Nickel-plated.
$0.70.



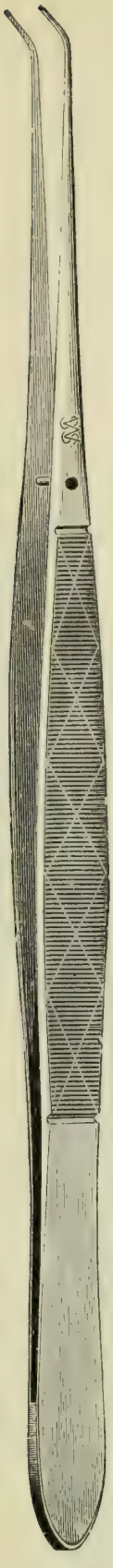
No. 16.
Distal Plug Pliers.
Nickel-plated.
$2.00.



No. 17.
DR. FLAGG'S
Dressing Pliers.
Nickel-plated.
$1.25.

PLIERS.

WATLING PLIERS.



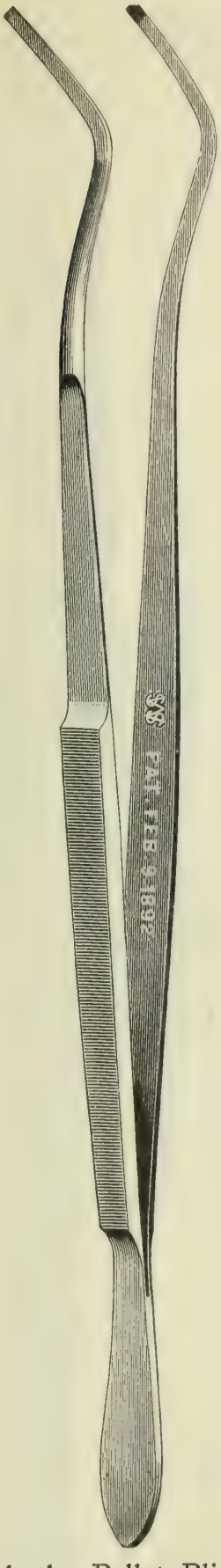
No. 20.

These Pliers by Prof. Watling are light and strong, perfectly balanced, with points long and slender and nicely curved.

Price,
Nickel-pl'td, $1.25

DR. HOW'S PELLET PLIERS.

Patented February 9, 1892.



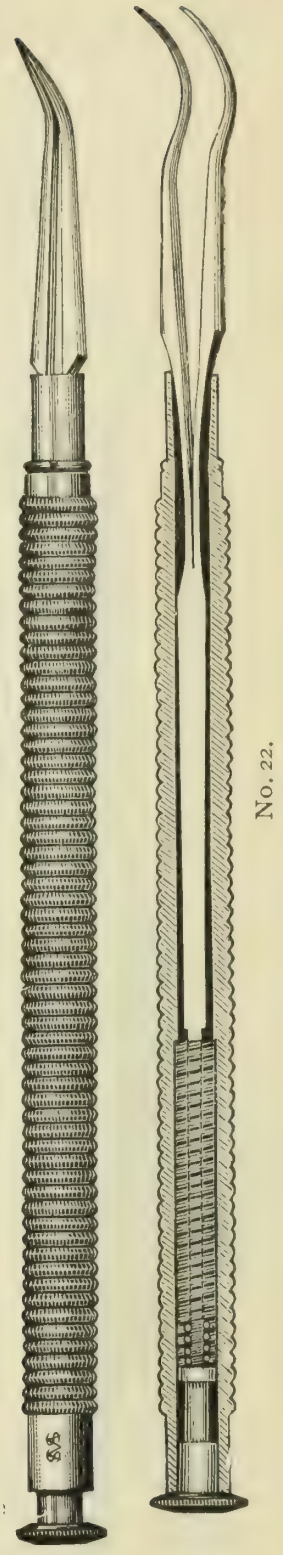
No. 21.

With the Pellet Pliers a pellet of foil or mat gold may be placed with the least possible risk of squeezing it out of shape by undue pressure.

Price, Nickel-pl'td, $1.25

SPRING RETRACTION PLIERS.

Suggested by Dr. A. H. Gilson.



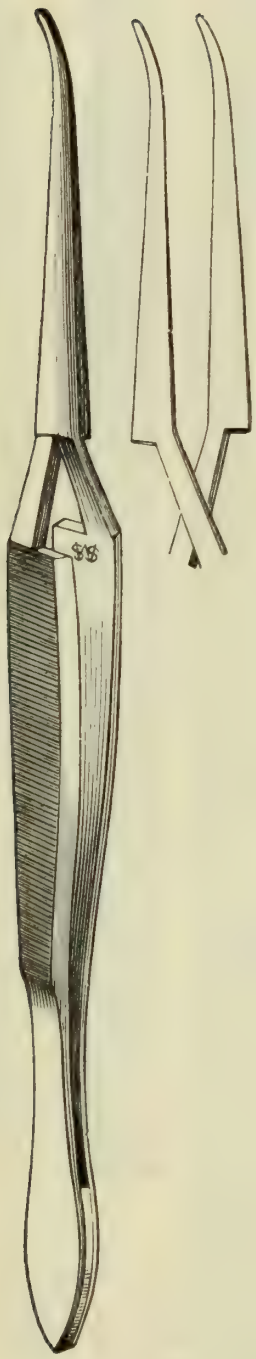
No. 22.

These Pliers are governed by a push-button screwing into the head of the coil-spring, at the end of the handle, allowing the "grip" to be readily varied.

Made with jaws of two angles, designated A and B.

Price of either,
Nickel-plated . $1.50

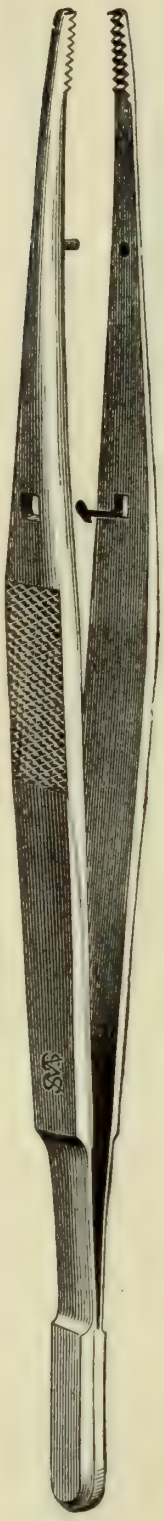
Cross-Action and Tape Pliers.



No. 13.

Dr. LEE'S
Cross-Action Pliers.

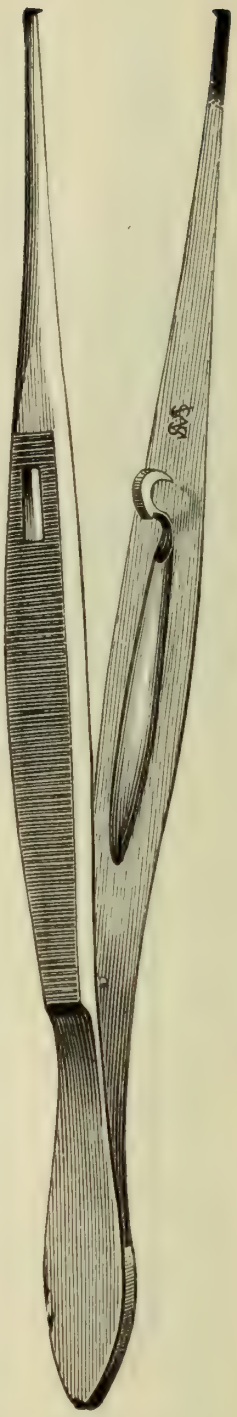
Nickel-Plated $1.50.



No. 14.

Dr. HOLMES'S
Tape Pliers.

Nickel-plated $2.50.



No. 15.

Dr. BOGUE'S
Tape Pliers.

Nickel-plated $2.50.

Canal-Point Carriers.

Suggested by Dr. Alex. F. Jameson.

No instrument could be better adapted to the purpose for which it is intended than the grooved-beak Pliers.

They are specially designed for handling nerve-canal points. With the flat-beak pliers it is very difficult to hold these small points securely while forcing them into the nerve-canal, but with the grooved beaks, as shown in the cut, there will be no difficulty, the forms of the points and the plier-beaks being perfectly adjusted to each other.

PRICE.

Nickel-plated, per pair $1.25

No. 23.

CROSS-ACTION DRESSING PLIERS.

Suggested by Dr. Gordon White.

A dentist will sometimes seize a pellet and place the pliers between his teeth while preparing to place the pellet. These Cross-Action Pliers automatically hold the pellet ready for instant application to dry a cavity or to dress a canal or pocket. They are also capable of convenient use as plug pliers. They are delicately shaped, finely finished, and nickeled.

PRICE.

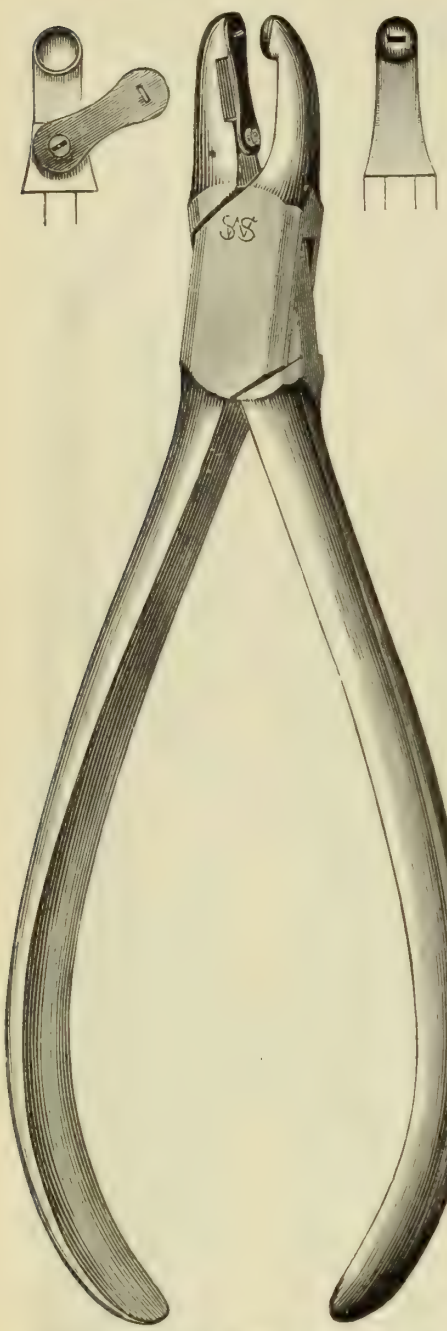
Cross-Action Dressing Pliers, No. 24 . . . . each $1.50

No. 24.

CONTOURING PLIERS.

S. S. White, with Punch.

Patented April 27, 1886.

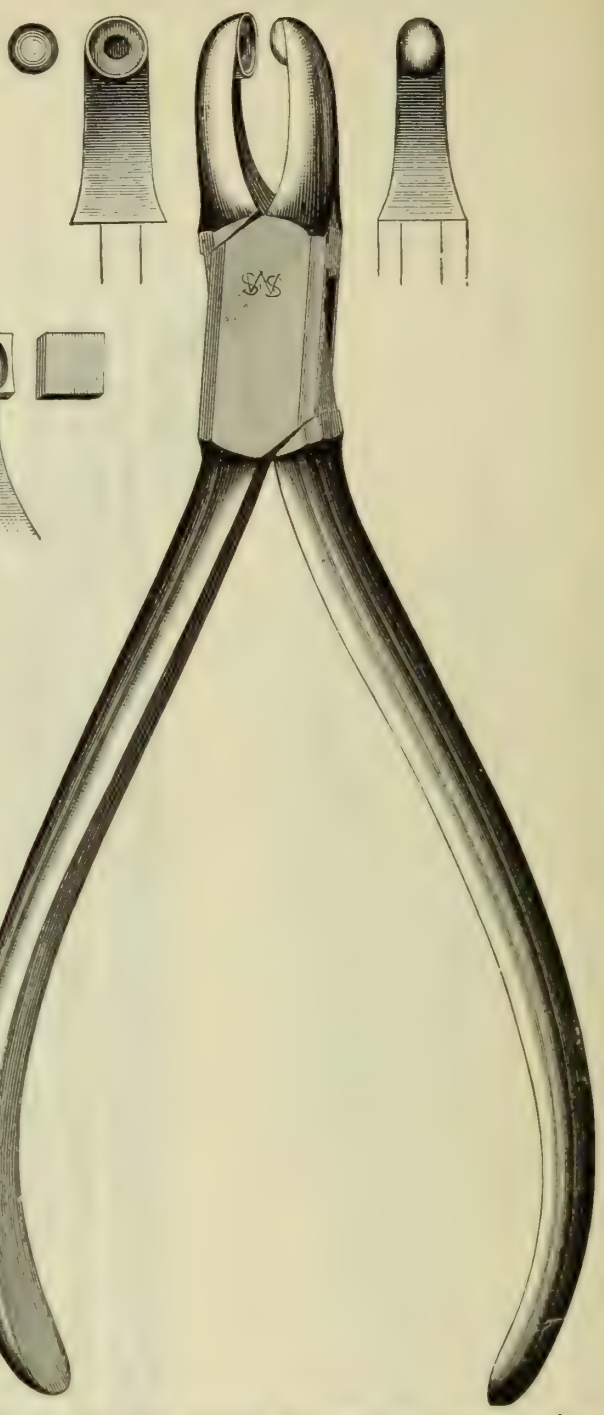


The salient features of the S. S. White Contouring Pliers are the circular form of the convex boss and its seat, and the guard punch, in which last respect these pliers are unique. The faces of the contouring beaks are calculated for the most delicate manipulation in shaping collars. The punch swings out of the way when not in use, and is always present when wanted.

Polished and Nickel-plated all over, except the punch attachment, which is blued. Smooth, rounded handles.

Price . . per pair $2.00

Abell's.



In the Abell Pliers the contouring boss and its concave complement are circular, but somewhat larger than in the S. S. White. Provision is also made for a lead or pattern-metal seat for the contouring boss in the concaved beak. With these Pliers crowns can be contoured very close to the edge without stretching it, or a shell can be contracted without cutting or buckling. The soft lead seat assists in preserving the gold from abrasion. A package of shot for the lead seat accompanies each pair.

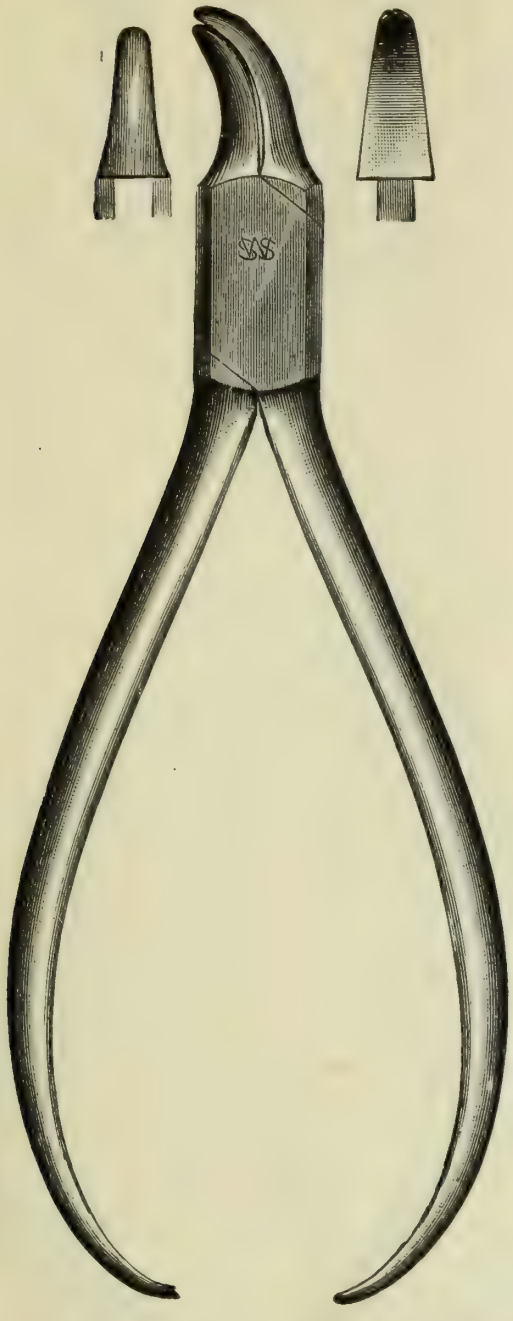
Finely finished, and Nickel-plated all over. Smooth, rounded handles.

Price . . per pair $2.00

CONTOURING PLIERS.

Crescent.

Devised by Dr. C. J. Reynolds.



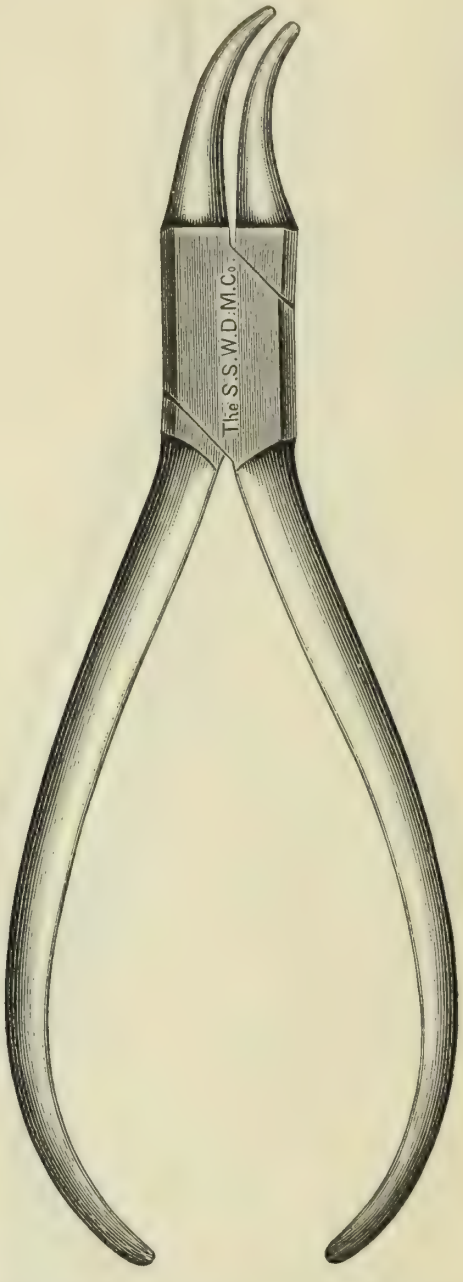
In the Crescent Contouring Pliers the inner surface of the longer beak is nearly flat, with the edges rounded off, and that of the shorter is rounded all over. Exceptionally convenient and efficient for imparting any desired degree of crown contour, and also for constricting and conforming the cervical part of the crown or band. Simply pinching the band border between the beaks, and at the same time bending the border slightly inward, repeated progressively to the right or left, will reduce the size of the band as desired.

Finely finished, and Nickel-plated all over. Smooth, rounded handles.

Price . . per pair $1.50

Curved.

Devised by Dr. H. H. Burchard.



Both beaks of the Curved Contouring Pliers are rounded all over, much like ordinary round-nose pliers with the beaks bent to the average curve of the buccal and lingual walls of bicuspids and molars. Adapted to give the correct anatomical curves to bands for collar crowns.

Two sizes, respectively 4½ and 5 inches long. The heavier pair can also be used to adapt clasps to the curving surfaces of the teeth.

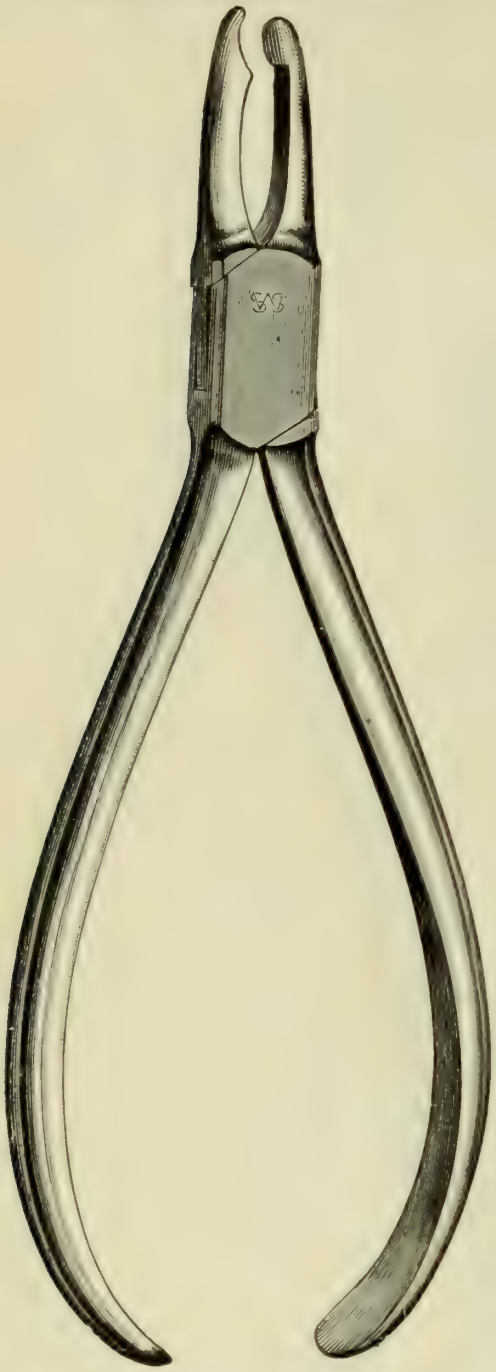
These Pliers are cheap in price, common-sense in design, and applicable in a wide range of cases. Made specially for our sales.

PRICES.

4½-inch . . .	$0.90
5 " . . .	1.00

CONTOURING PLIERS.

Dr. H. H. Johnson's.

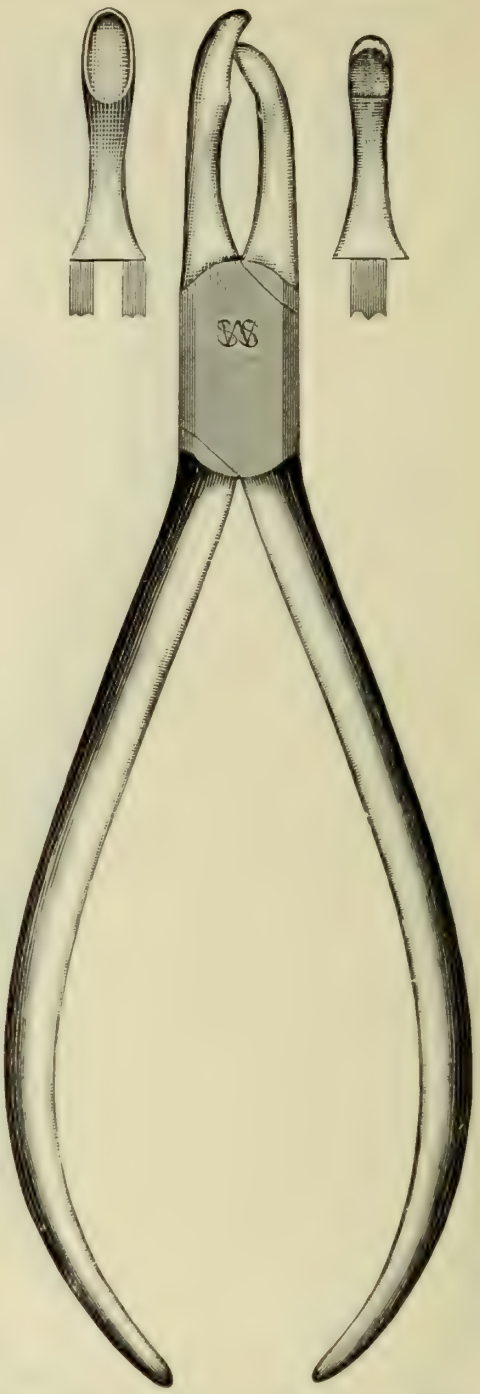


In the Johnson Pliers, one beak is scalloped out to form a seat for the boss with which the other beak is armed. The boss is oval in shape. This simple adaptation makes an excellent shaper for the gold in contouring gold crowns or fitting bands to roots.

Finely finished, with smoothly rounded handles, and Nickel-plated all over.

Price . . per pair $1.50

Dr. W. P. Dickinson's.



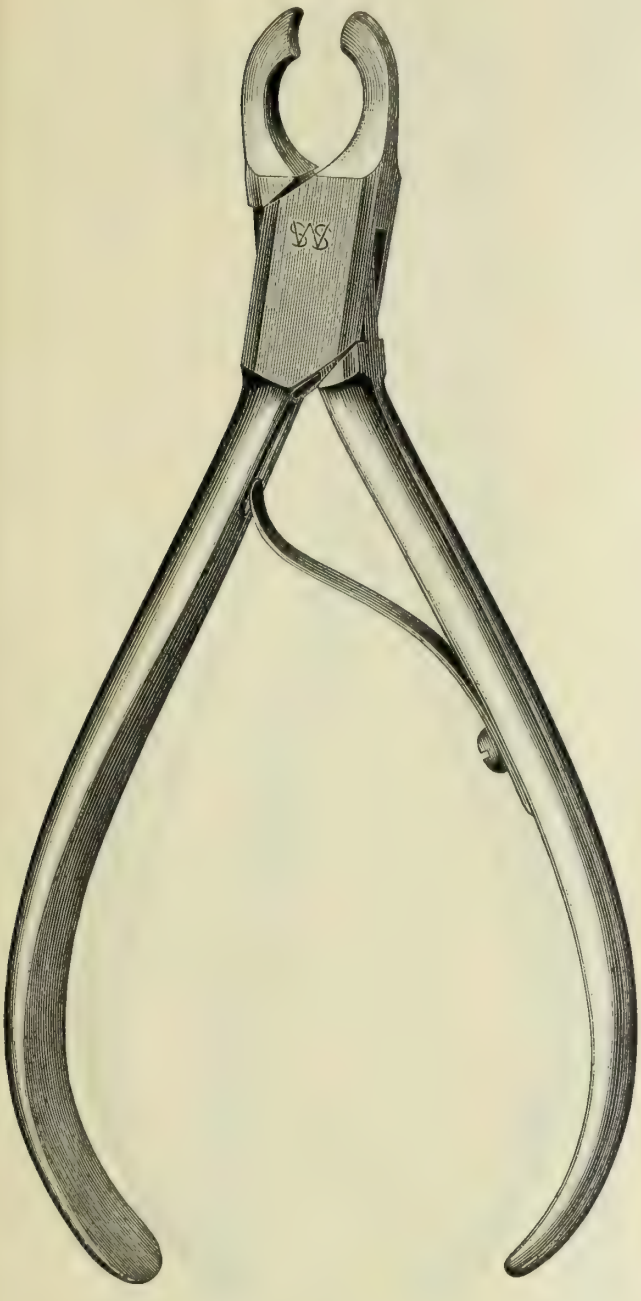
The distinctive advantages of these Pliers are found in the peculiar form of the boss and its counter-beak and the enlarged space between them. The beak which forms the boss is curved around so as to strike upon its oval seat in the counter-beak nearly endwise. Any part of a gold crown, from the neck to the coronal surface, can be accurately contoured; also of particular value in adapting the seam where the cap joins the band and in crimping in at the neck. Suitable in form and size to serve equally well for narrow bicuspids and broad molars.

Finely finished, and Nickel-plated all over. Smooth, rounded handles.

Price . . per pair $1.50

CONTOURING PLIERS.

Pattern by Dr. J. G. Lane.



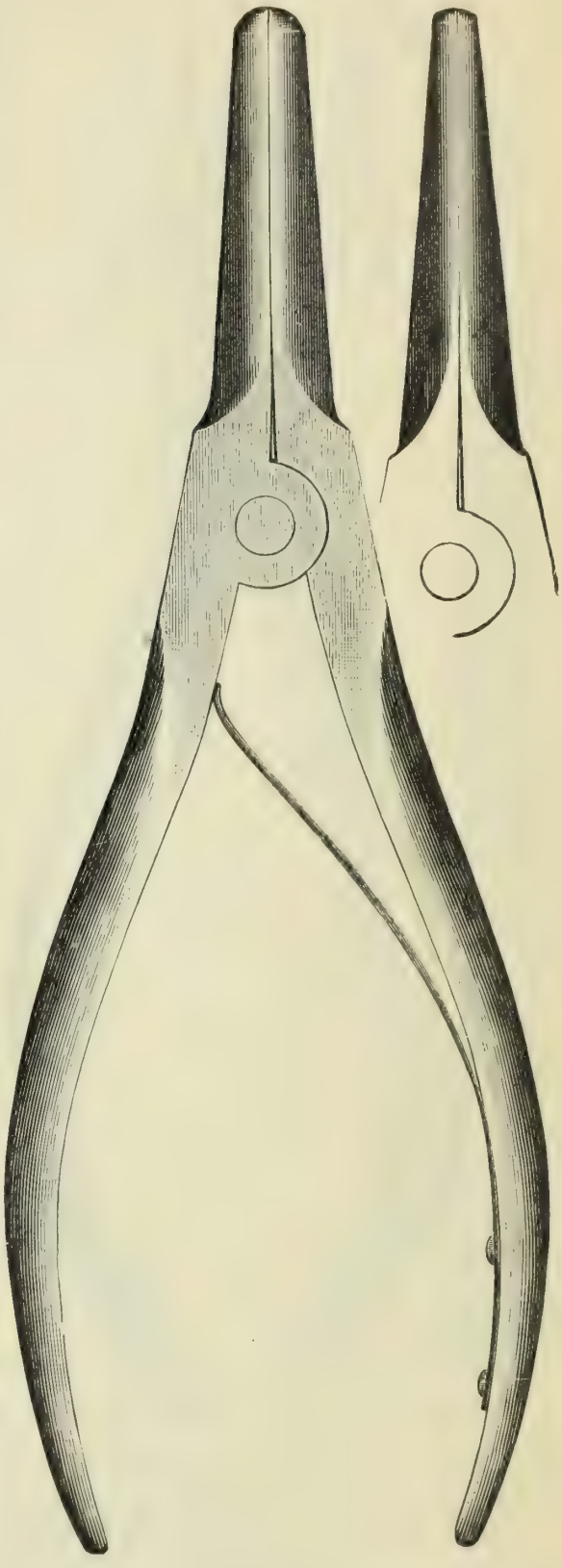
Rather thin beaks, with plenty of room behind the working points, permit very exact manipulation. The faces of the boss and its counter-beak are shaped to give the average curve of natural crowns, and they come together almost endwise. The concave counter-beak has its edges rounded to prevent bruising the plate. A delicate spring holds the handles comfortably against the hand, and keeps the beaks open when not in use.

Finely finished, and Nickel-plated all over. Smooth, rounded handles.

Price . . per pair $1.75

CROWN EXPANDERS.

Device of Dr. Geo. Evans.

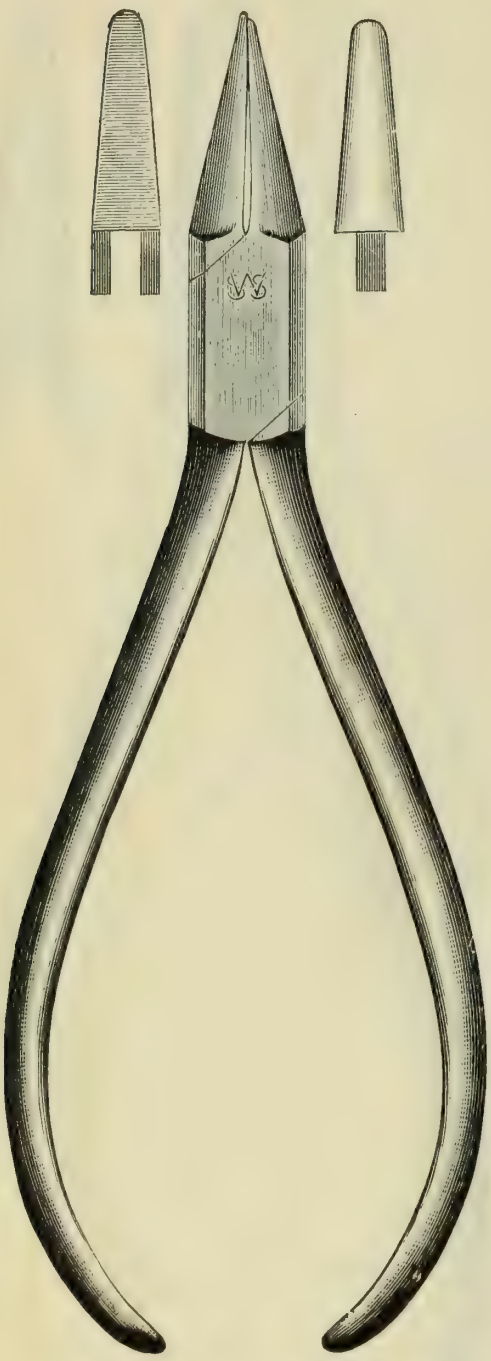


A handy instrument for enlarging gold crowns or collars. By proper manipulation, these Expanders can be used to enlarge any portion in any particular direction, or the entire crown. Two sizes of beaks. Made for our sales.

Price, either size, Nickel-plated $1.00

COLLAR PLIERS.

Devised by Dr. C. L. Robinson.

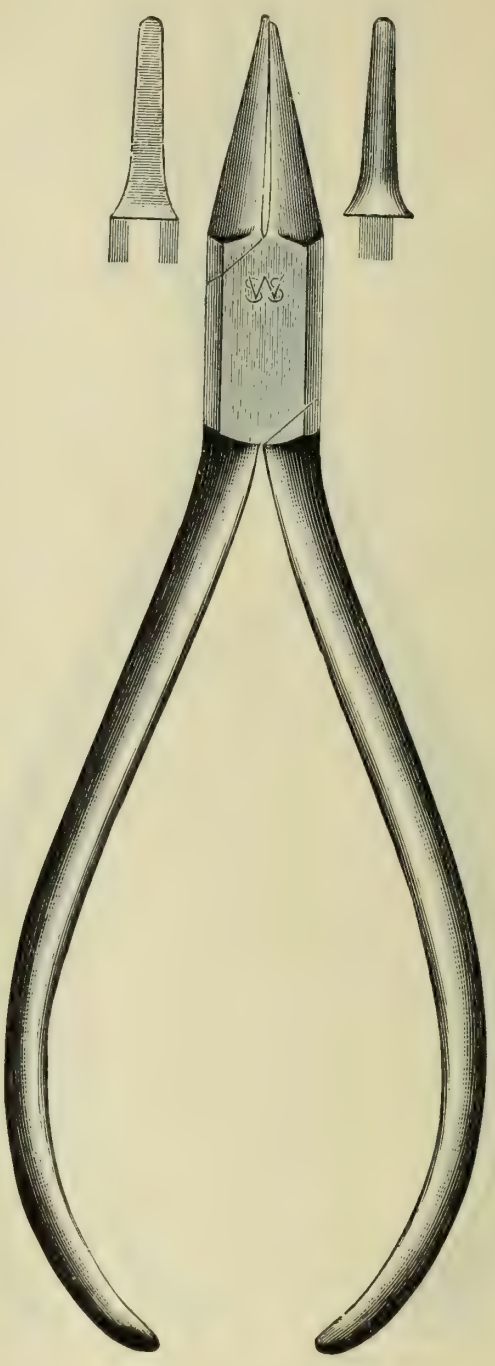


The beaks are made of unequal lengths, the longer being flat on its inner face, and the shorter rounded off at the edges, making it slightly oval in shape. Used for shaping, fitting, and contouring collars for all sizes of crowns.

Finely finished, and Nickel-plated all over. Smooth, rounded handles.

Price . . per pair $1.50

Suggested by Dr. F. A. Peeso.



A modification of the Robinson Pliers, the beaks being made of the same general shapes, but quite narrow, to adapt them more especially to the small curves of lower lateral and bicuspid collars or cap-crowns. They can be readily used for forming collars of any size. They will also be found useful in contouring caps and collars.

Finely finished, and Nickel-plated all over. Smooth, rounded handles.

Price . . per pair $1.50

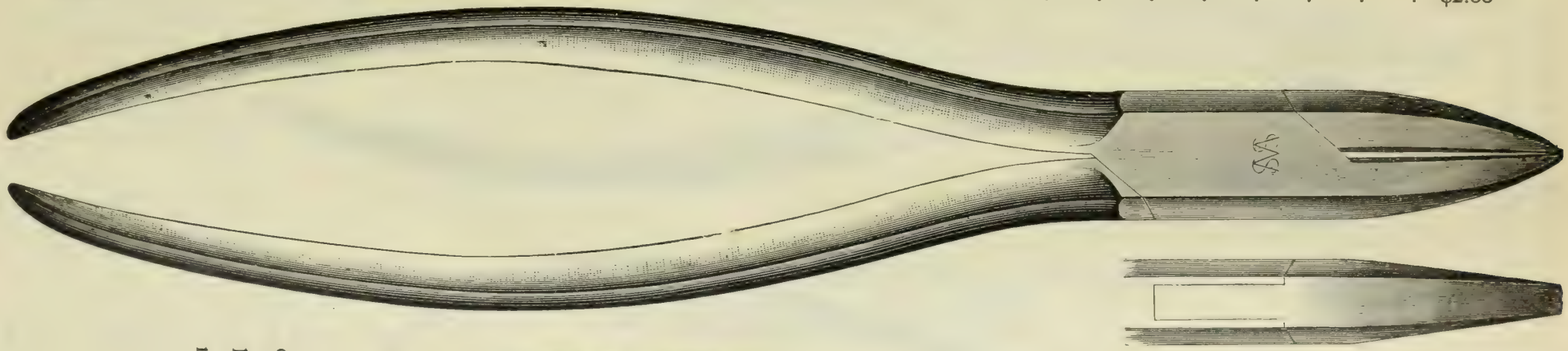
WAFERING PLIERS.

Pattern of Dr. J. Foster Flagg.

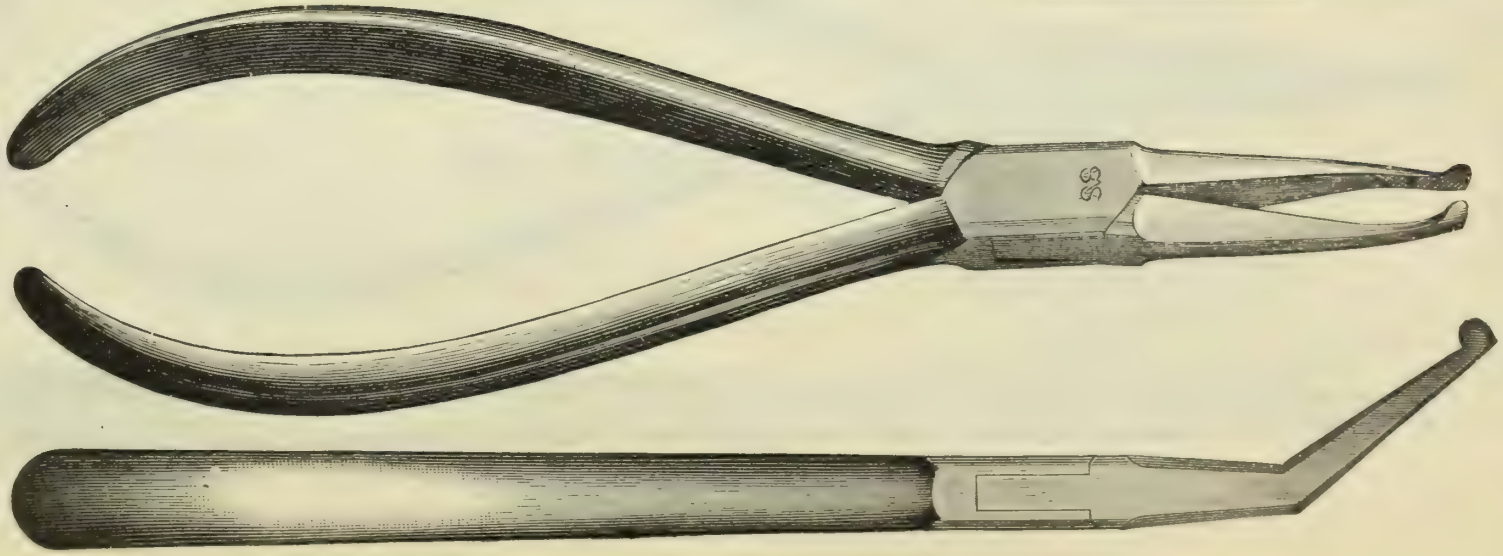
Dr. J. Foster Flagg says, "The squeezing of amalgam should be done with large, strong Pliers, as illustrated,—made expressly for this purpose.

"The difference in the characteristics of *wafers* made by using the ordinary pliers and those made by the *appropriate* pliers can only be realized by comparison of the two results; and the success of *wafering* is widely different when done by *thoroughly-squeezed* instead of *half-squeezed* wafers."

Price $2.00



CROWN PLIERS.



No. 10.

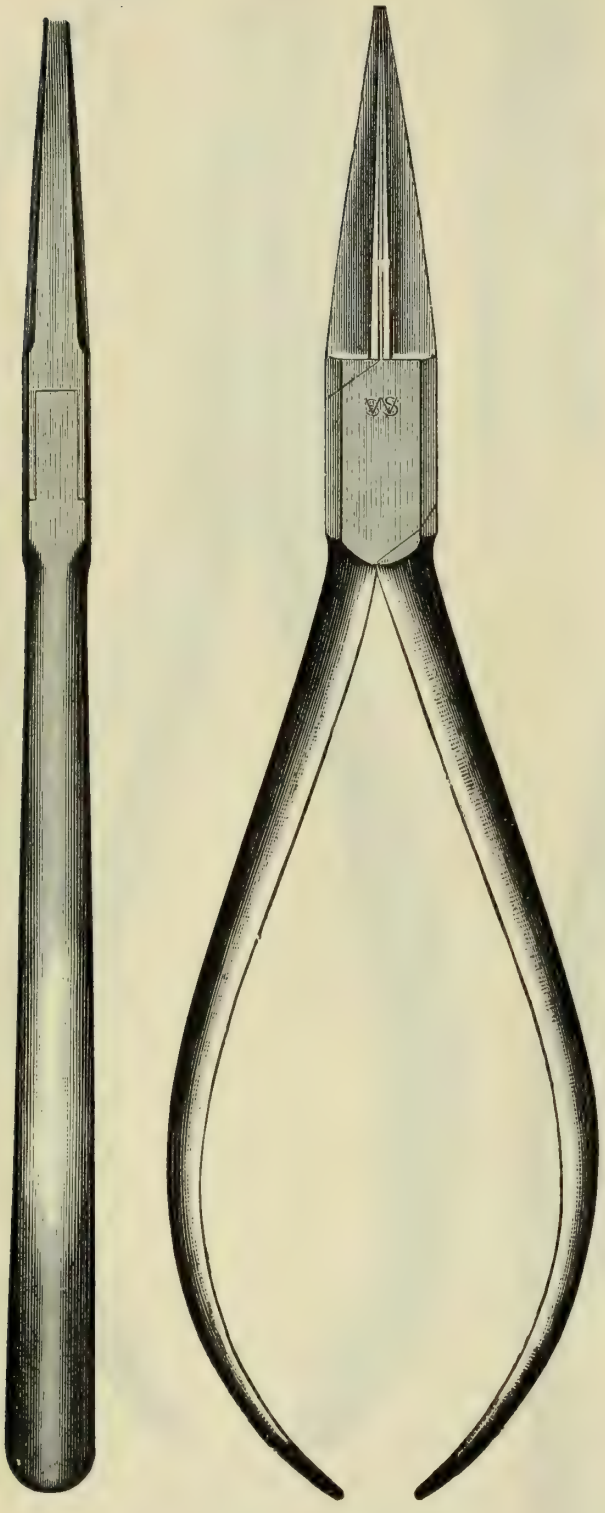
No. 11.

Nos. 10 and 11, straight and curved Pliers for bending pins over posts in Dr. How's process of mounting artificial tooth-crowns.

PRICES.

No. 10, Nickel-plated,
Straight . . . $1.50
No. 11, Nickel-plated,
Curved . . . $1.75

Laboratory and Office Pliers.

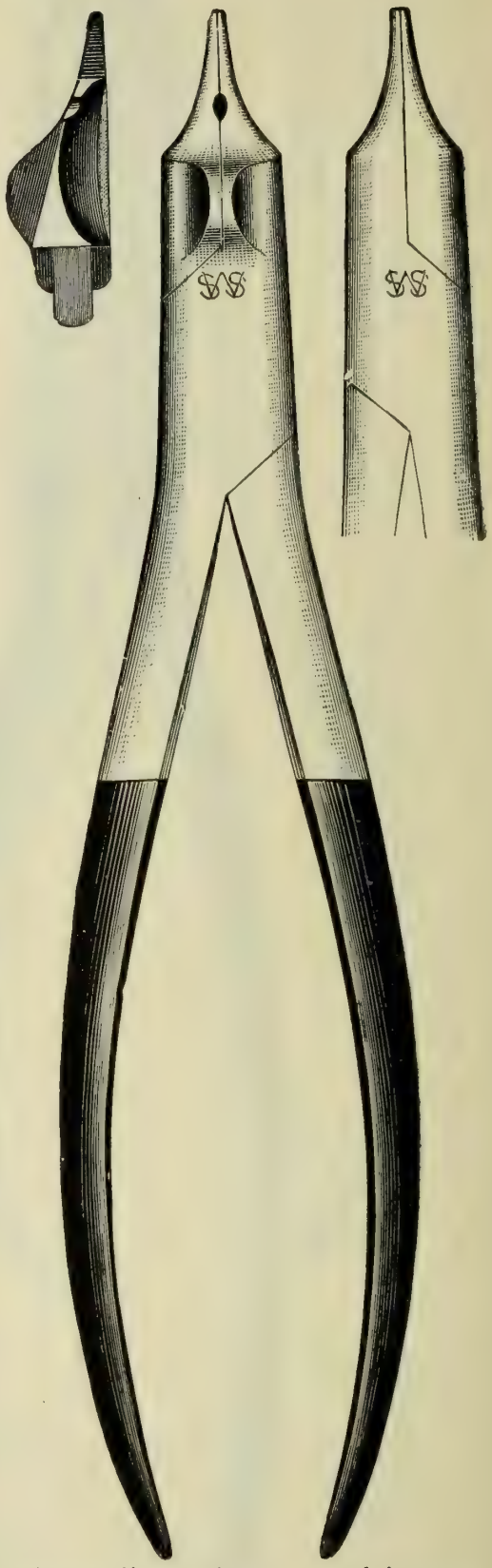


The most useful, durable, and satisfactory flat-nose Pliers for general laboratory and office use at the service of the dentist. They are made just as well as our Contouring Pliers, with the working faces of the beaks coming into perfect apposition. Well worth the difference in cost between them and common pliers.

Finely finished, and nickel-plated all over. Smooth, rounded handles.

Price . . per pair $1.50

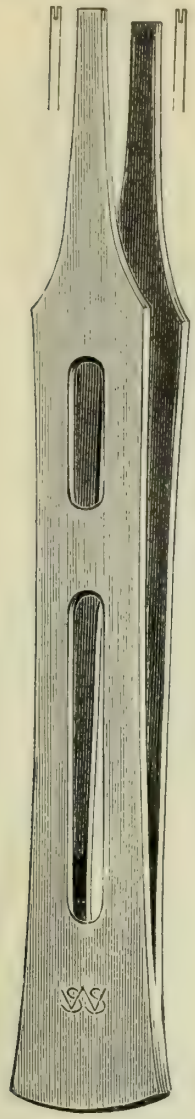
Pin-Roughening, Cutting, and Bending Forceps.



This appliance has several important uses which entitle it to a place among recognized mechanical forceps. It may be employed as a wire-cutter, for bending clasps, or for roughening the posts of crowns so that the cement with which they are set shall take a firmer hold upon them. Its value to crown- and bridge-workers especially is at once apparent.

Price . . per pair $2.50

The Hollingsworth Band Pliers.

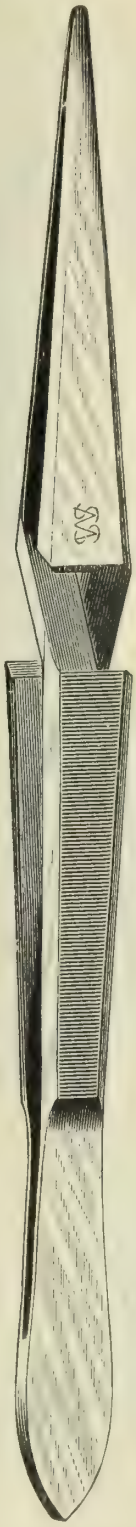


One of those handy little contrivances whose use will be apparent to crown- and bridge-workers. They are especially designed for use with the Hollingsworth Contouring System to enable the operator to quickly form a matrix for the band. The outer edge of a band is placed in the slotted ends (see side cuts) and that portion which fits the neck made sufficiently hot to burn its outline, for a slight depth, in a wooden block. The neck of the band, held by the matrix thus formed in the block, will not become enlarged or changed in shape during the process of contouring.

Price . each $0.25

Crown and Bridge Pliers.

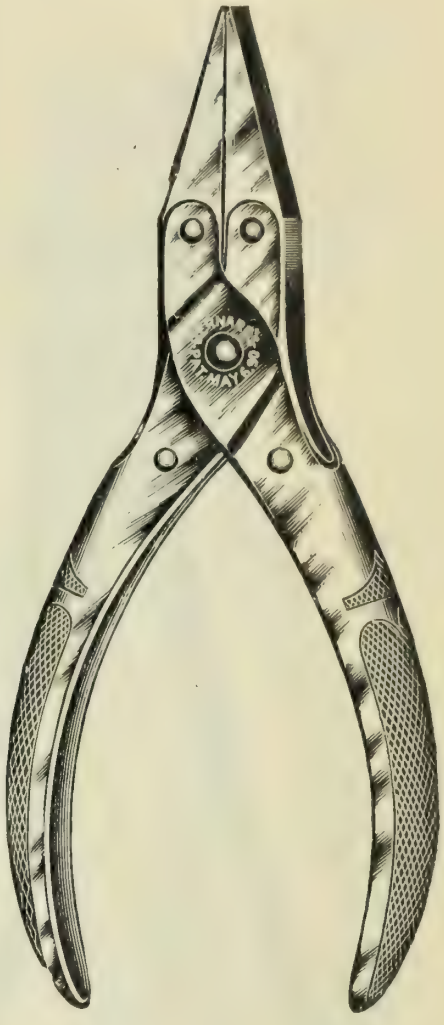
Suggested by
DR. G. W. WARREN.



A modification of the well-known Lee Cross-Action Pliers to adapt them to the needs of crown- and bridge-workers. They are made heavier all over. The crown or band is held firmly by the spring in the handle.

Price, per pair $1.00

PARALLEL PLIERS.



To the dentist who does metal plate-work, Parallel Pliers are a laboratory necessity. The jaws are exactly parallel along the entire bite, so that whatever they grasp is held immovably, whether a piece of plate as thin as cardboard or a quarter-inch thick.

These Parallel Pliers are not our make, but they are very well made for all that. They are finely file-cut all along the biting surface of both jaws. One jaw has a longitudinal groove throughout its length to hold wire.

Nickel-plated all over.

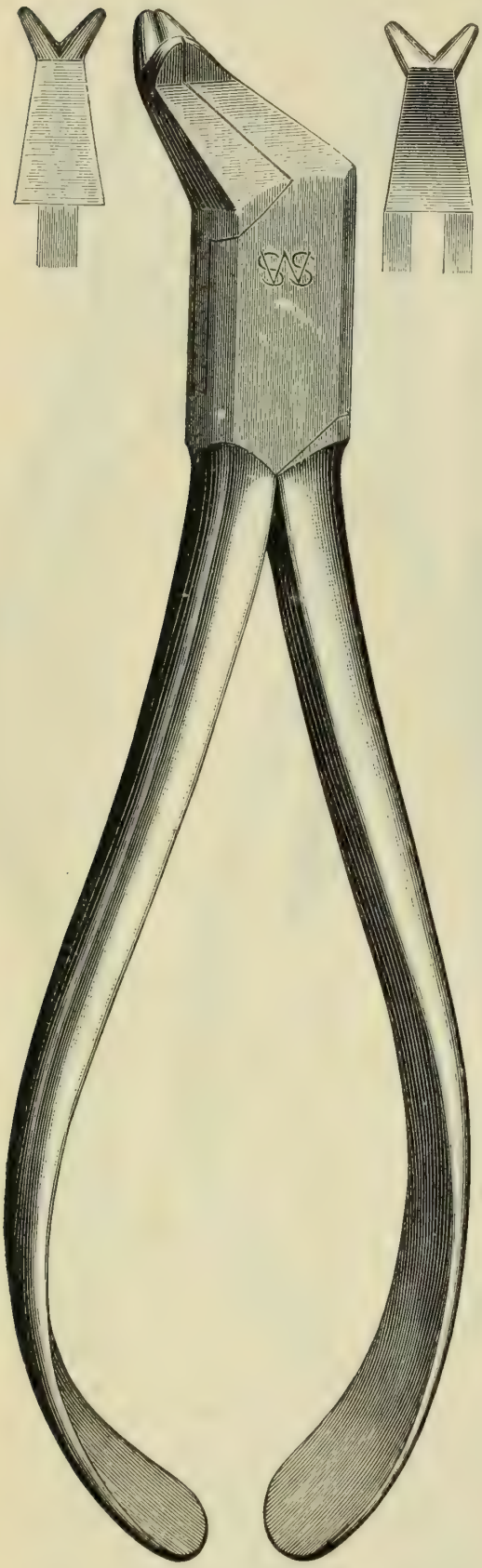
PRICES.

4½-inch, per pair, $0.80
5 " " .90

Wire Stretching Pliers.

Devised by Dr. Edward H. Angle.

Patent applied for.

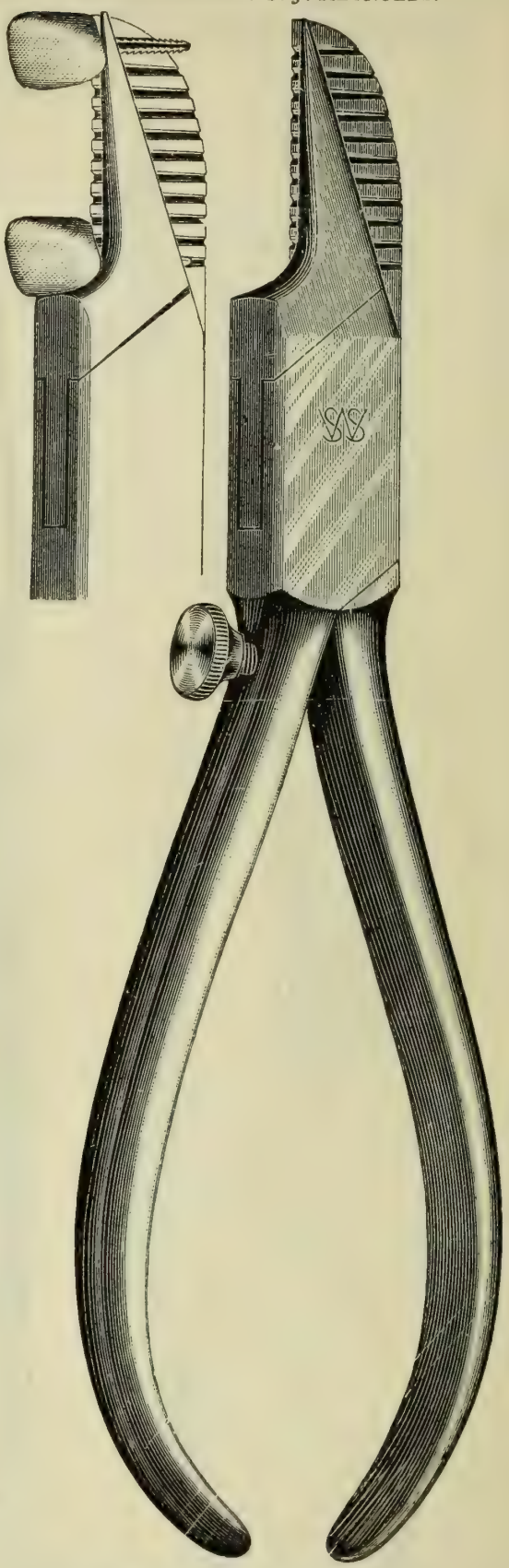


These Pliers are found especially useful in regulating the teeth. Its peculiar form renders it easy of application in any part of the mouth. A little experience in its use will render the operator skillful, and he will probably be surprised to see how much can be accomplished with it. It should not be used on hard or large wire.

Price $3.75

Post Barbing Pliers.

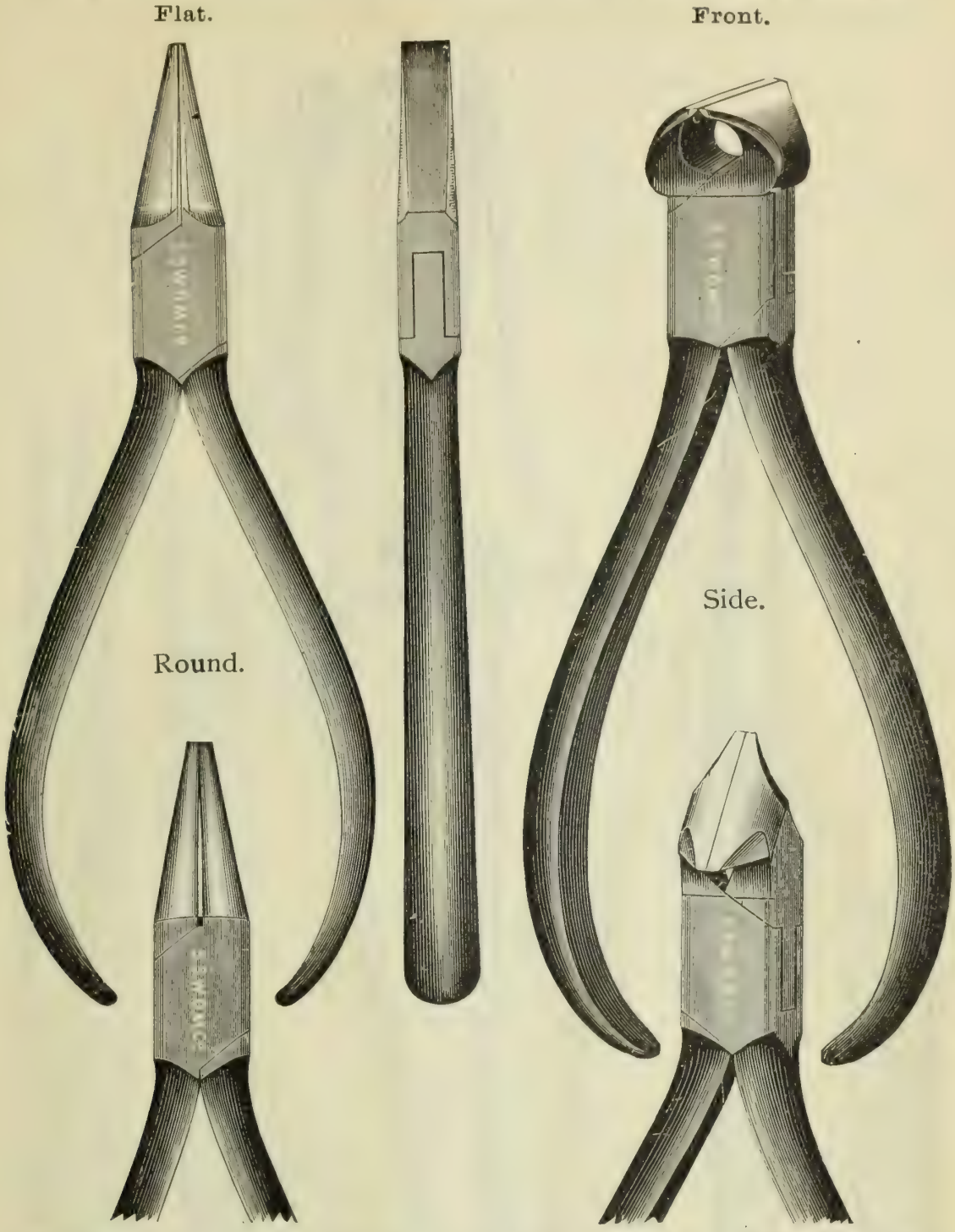
Invention of Dr. C. J. Reynolds.



The retention of a crown-post in a tooth-root is usually made more secure by roughening or barbing it. This is rendered easy and done with regularity by means of the novel pliers illustrated. Round or square posts may be barbed before or after its attachment to the crown. The side cut shows a Logan crown-post as first held corner upwards in a groove near the pivot, and barbed near the post-end by compressing the pliers handles; then the post is placed in the next groove.

Price . . . each $4.00

SOLID STEEL PLIERS AND NIPPERS.



Two important points of this unequaled line of Pliers and Nippers: First, they are of steel throughout, the ordinary appliances of their class having iron handles with steel-faced points. Second, the finely-proportioned and smoothly wrought-out handles afford firmness of grip with a comfortable "feel," the ends being rounded off so as to avoid cutting or bruising the hand when pressure is applied.

The Nippers, both front and side, are made in two sizes, 4 and 4½ inches; the Pliers in three sizes, 4, 4½, and 5 inches.

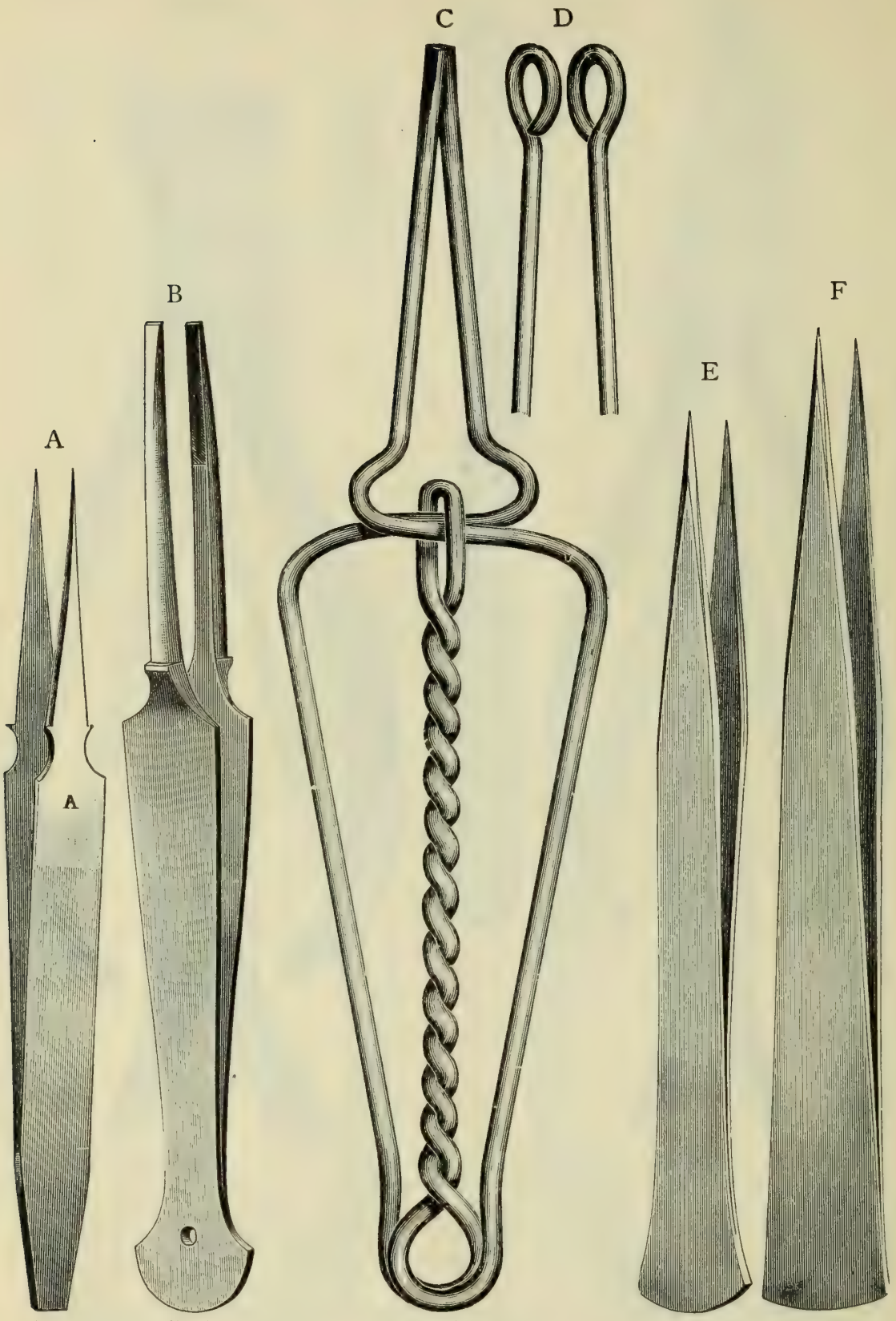
These are made especially for our trade, but do not bear our Trade-Mark ℣℣, as that is placed upon goods of our own make only.

PRICES.

Nippers, Front or Side, 4 or 4½ inches, Plain .	per pair,	$0.80
" " " 4 or 4½ " Nickel-plated	"	1.00
Pliers, Flat or Round Nose, 4 or 4½ inches, Plain	"	.50
" " " " 4 or 4½ " Nickel-plated	"	.65
" " " " 5 inches, Plain .	"	.55
" " " " 5 " Nickel-plated	"	.70

We also carry in stock a line of German Pliers and Nippers. See Condensed Catalogue for prices.

SOLDER TWEEZERS.

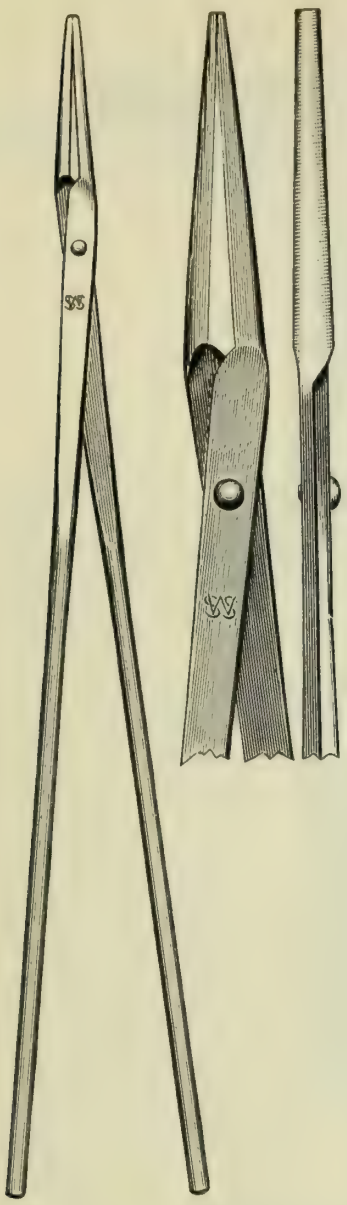


"A," $0.25. "B," $0.10 "C" or "D," $0.15. "E," 4½ in., $0.15. "F," 5 in., $0.20

A, B, C, and D are old and well-known forms. E and F were more recently brought out. They have sharp, delicate points and an easy spring, combined with broad surface for hand-hold. They will be found a very convenient addition to our laboratory instruments, particularly for crown- and bridge-workers.

SOLDER TWEEZERS.

Pattern by Dr. F. S. Belyea.

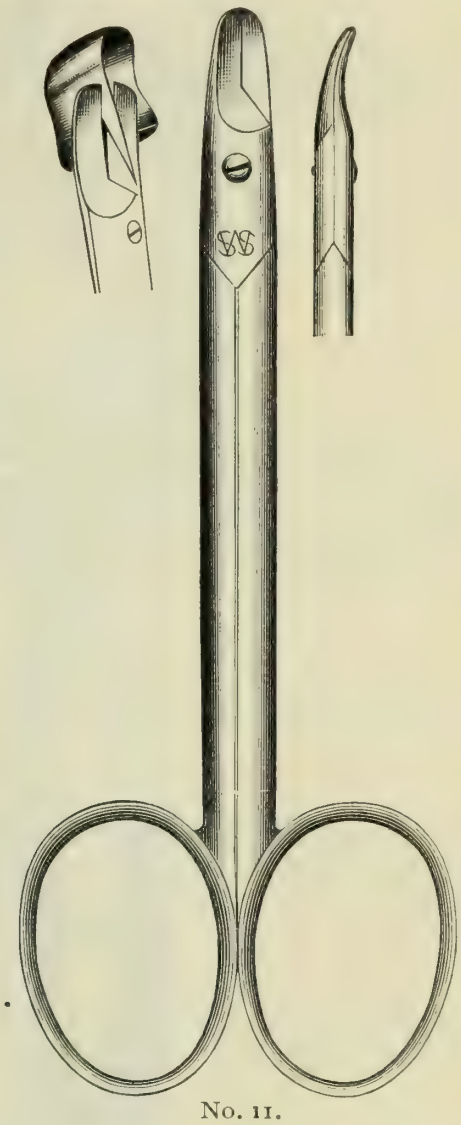


These Solder Tweezers are made long and slender in order to afford extreme delicacy of manipulation. The least pressure at the ends of the handles holds the solder or collar, and the slightest movement of one or both handles releases it. The extreme tips of the beaks are the working point. The illustration shows the appliance about half size, with the beaks exhibited full size in the side cut. The full length is 8½ inches. Dull nickeled.

Price . . per pair $0.30

COLLAR AND CROWN SCISSORS.

Suggested by Dr. J. H. Beebee.



No. 11.

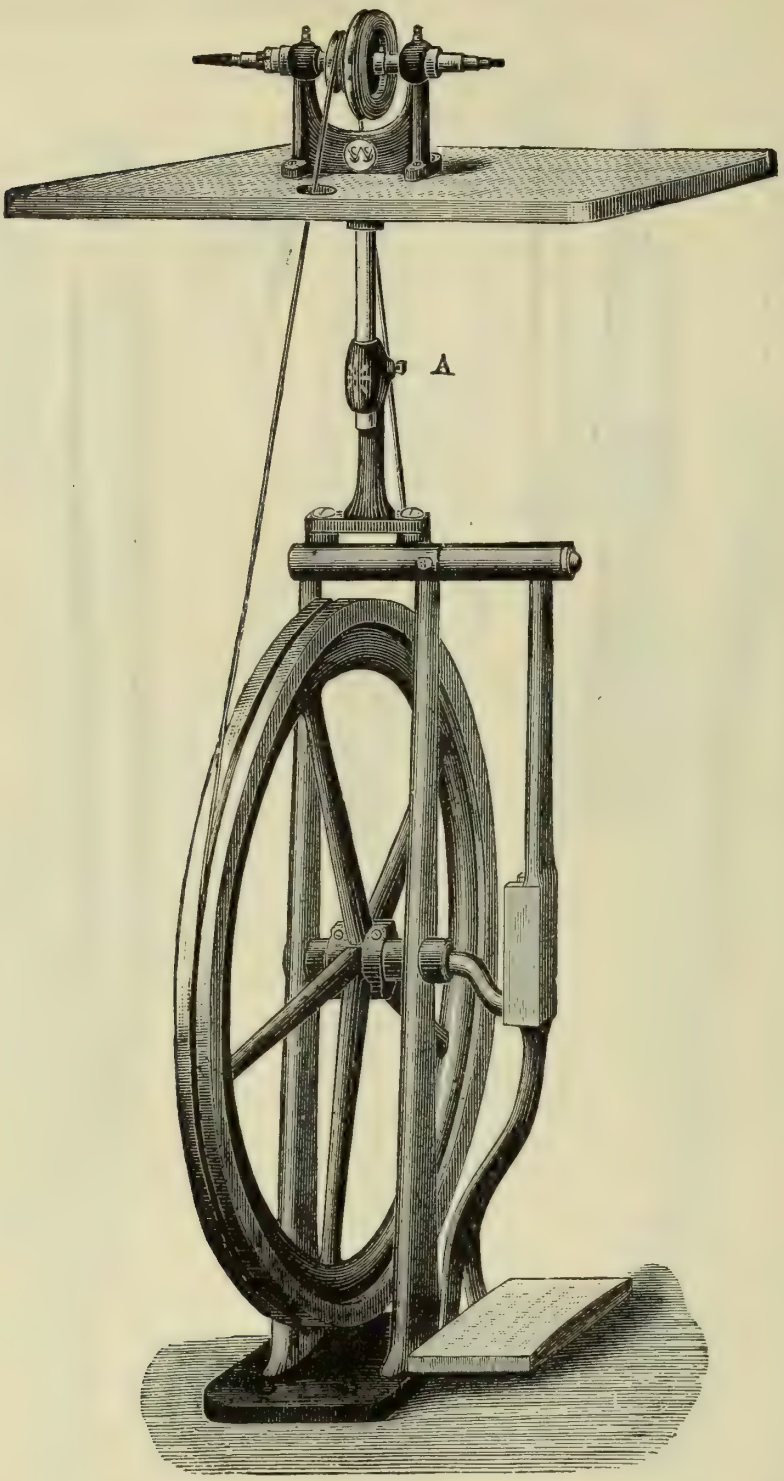
The cuts show the size, shape, and curved blades of the delicate device designed for scalloping the edges of gold collars and crowns as indicated in the illustration. Obviously the time and gold clippings saved will soon offset the cost of the Scissors. These are also useful for silk or thread ligature cutting, or even gum snipping. Their lightness of structure admirably adapts them for office uses, but of course precludes abuse in laboratory work.

Can be ordered as No. 11.

Price . . per pair $1.50

THE UNIQUE LATHE.

Patented March 7, 1882.



This Lathe is a combination of the Unique Lathe-Head and the No. 4 Driving-Wheel, made by mounting the Lathe-Head, on a table attached to a sliding standard, upon the frame of the Driving-Wheel. The sliding standard allows the operator to adjust the height of the Lathe to suit his convenience.

An ideal grinding and polishing apparatus of unique design and substantial construction, with a capacity for developing an abundance of power with but slight exertion.

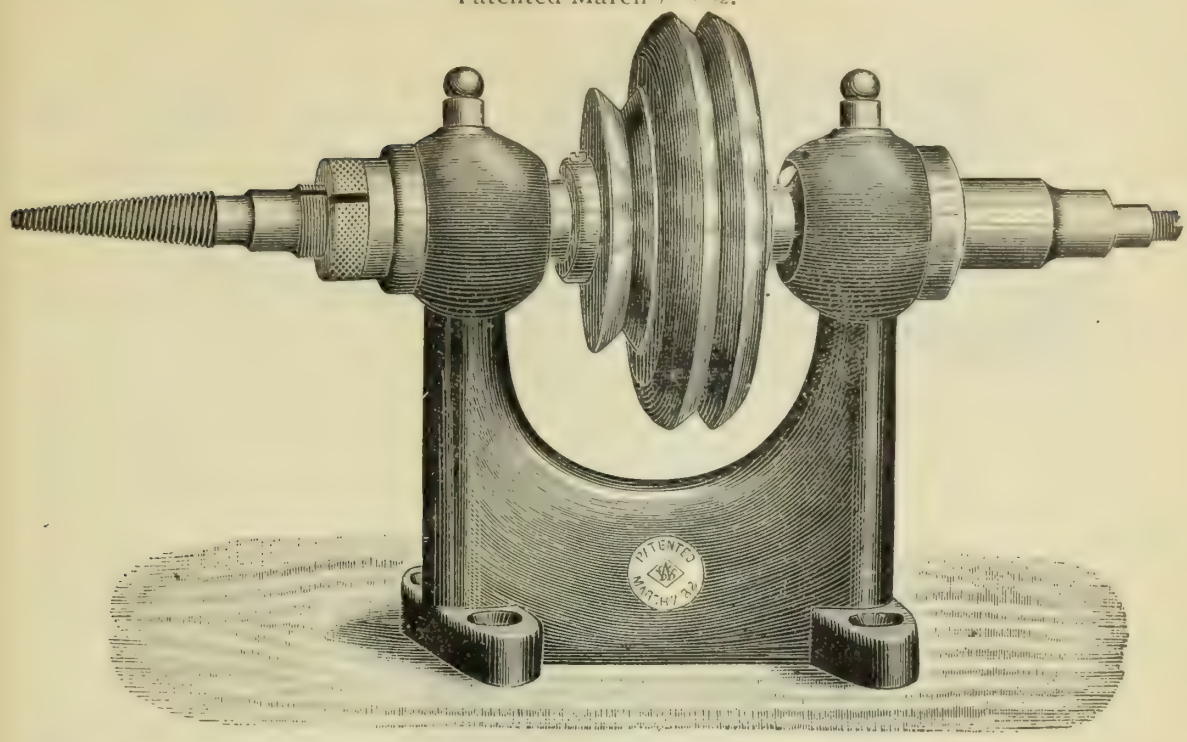
The table, made of selected ash, measures 15 x 18 inches. The sliding standard A has a range of 5 inches.

Hereafter there will be tool-drawers on the under side of the table.

Price, complete, including set of 8 Chucks . . . $25.00

UNIQUE LATHE-HEAD.

Patented March 7, 1882.



This Lathe-Head is unique

in its simplicity, in its accuracy of motion, and in its durability. Nowhere else can you get so much that is desirable in a dental lathe for so little money.

These are special points of value:

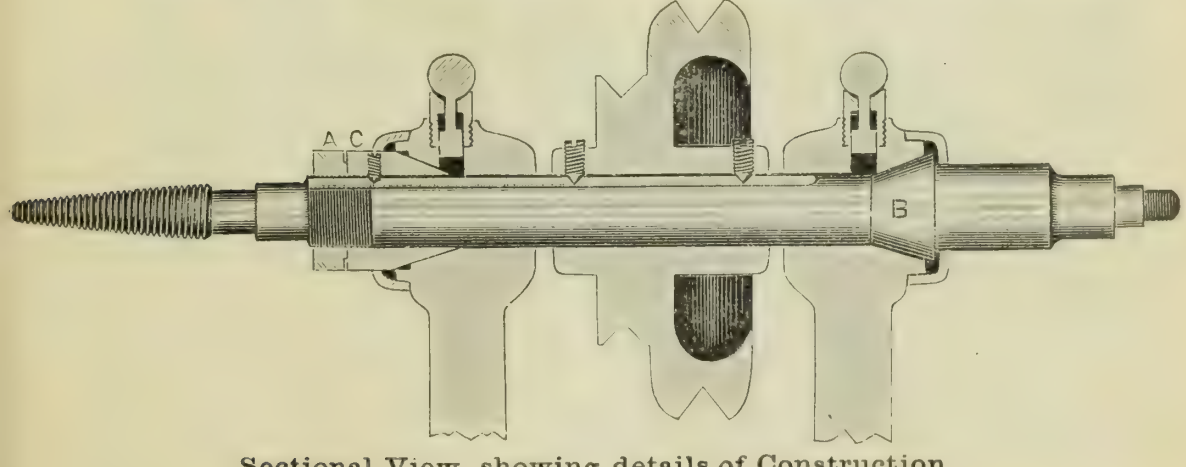
Coned bearings on the spindle,—one fixed, the other adjustable to take up wear,—the whole held in adjustment by a split jamb-nut. One end carries a threaded cone; the other is fitted to receive our regular set of Laboratory lathe-chucks.

Spindle Journals protected

from dust or polishing-powders by nickel-plated caps; oil-chambers over the journals closed by automatically acting globe-caps which cannot be displaced.

The Pulley,

which has two grooves for different speeds, is hollow to afford lightness, with the outer rim rounded to offer a safe grasp for the hand.



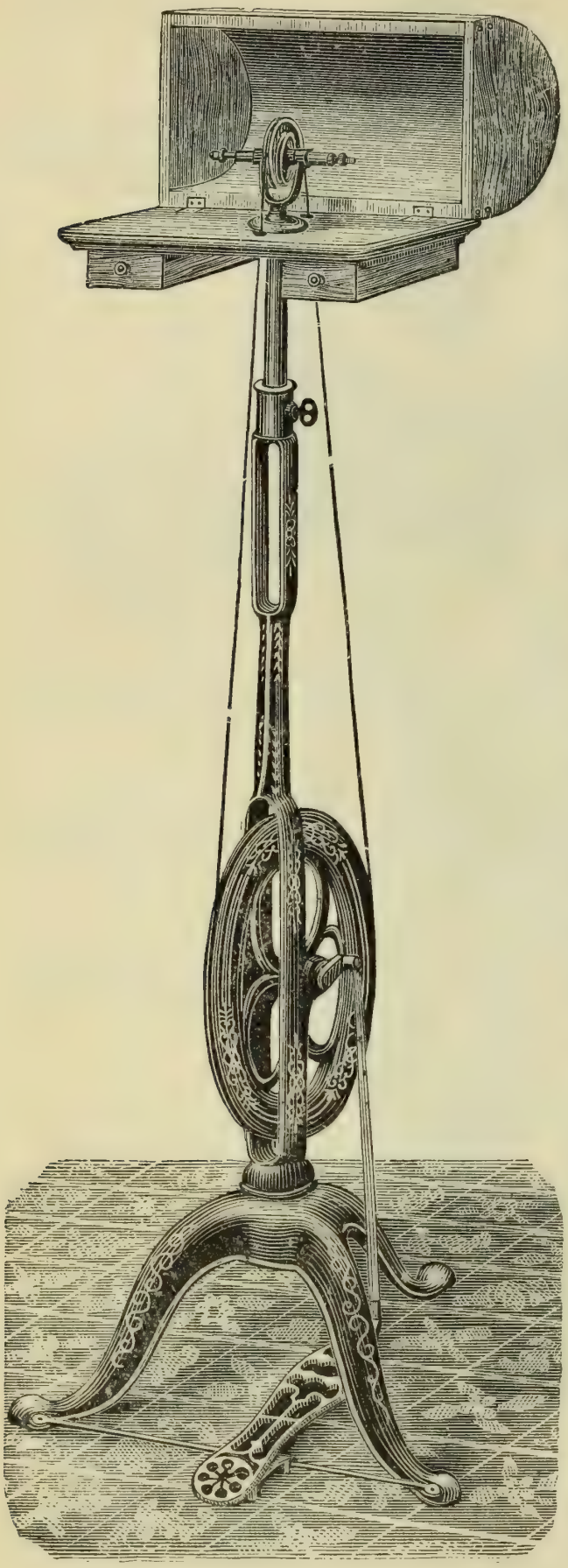
Sectional View, showing details of Construction.

PRICES.

Unique Lathe-Head, with Chucks (see page 35.) Nos. 1 to 8	$9.00
Unique Lathe-Head, without Chucks	6.50

THE S. S. WHITE LABORATORY LATHE.

No. 3.



No. 3 is a light-running Lathe for general laboratory work. It occupies a floor space of 10 x 23 inches. The treadle and crank are connected by a spring-pitman to keep the driving-wheel off center.

The pulley-head is provided with two grooves for different speeds; it can be raised or lowered 6 inches to suit the convenience of the person using it, and is held in position by a set-screw. One end of the spindle is adapted for the chucks, or, by using the nut, will carry corundum wheels Nos. 5 to 7. At the other end is a nut-clamp by which may be held straight-shanked engine-burs, corundum points, etc.

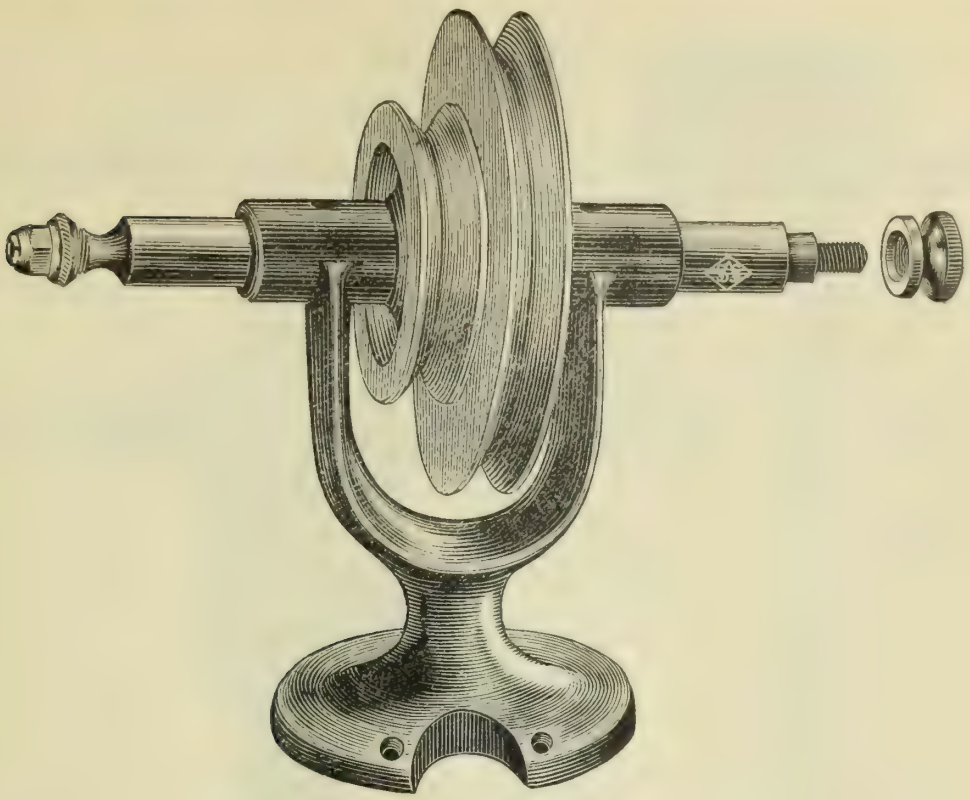
The details of the head are more clearly shown on page 35. Three chucks and a screw-cone (Nos. 1, 2, 3, 4,—page 35) accompany the Lathe.

Price of Lathe complete, with Chucks	$25.00
Boxing	1.00

For price of Head separately, see opposite page.

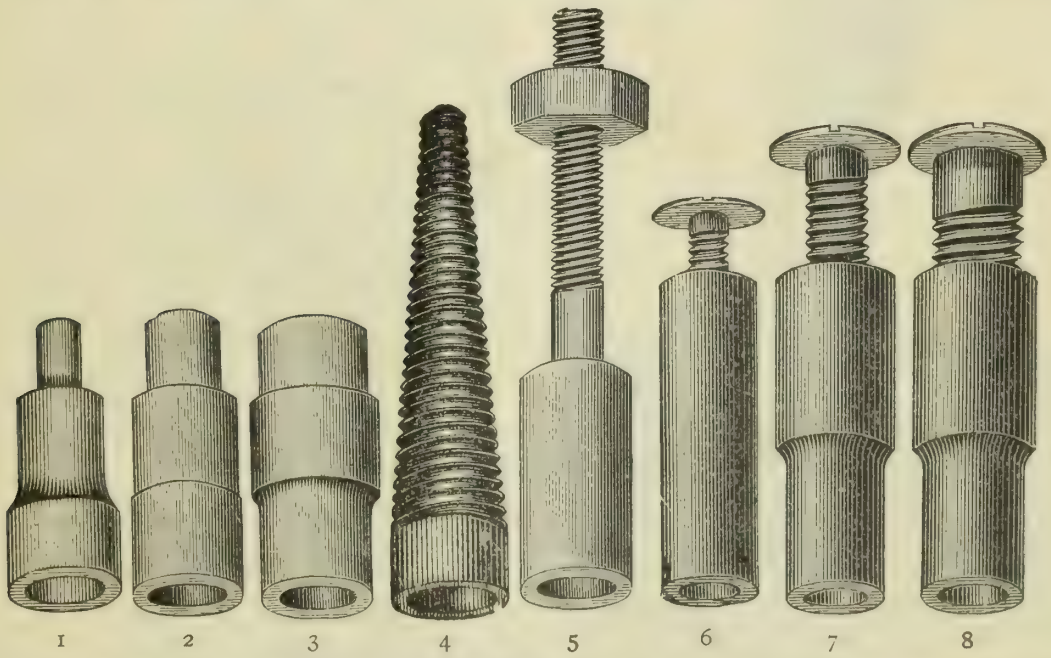
THE S. S. WHITE LABORATORY LATHE-HEAD.

No. 3.



Price, No. 3 Laboratory Lathe-Head, with Chucks Nos. 1, 2, 3, 4, and Wrench $5.00

CHUCKS FOR LABORATORY AND UNIQUE LATHES.



Nos. 1, 2, 3 are for corundum wheels, which are fastened on with shellac. No. 1 carries wheels Nos. 00 to 4. No. 2 carries Nos. 5, 6, 7. No. 3 carries Nos. 8, 9, 10. No. 4 is a screw-cone, very convenient for felt wheels and cones. No. 5, collar-and-nut Chuck for brush wheels, cotton wheels, etc. Nos. 6, 7, 8, collar-and-screw Chucks for corundum wheels. No. 6 carries Nos. 00 to 4; No. 7 carries Nos. 5, 6, 7, and No. 8 carries Nos. 8, 9, 10.

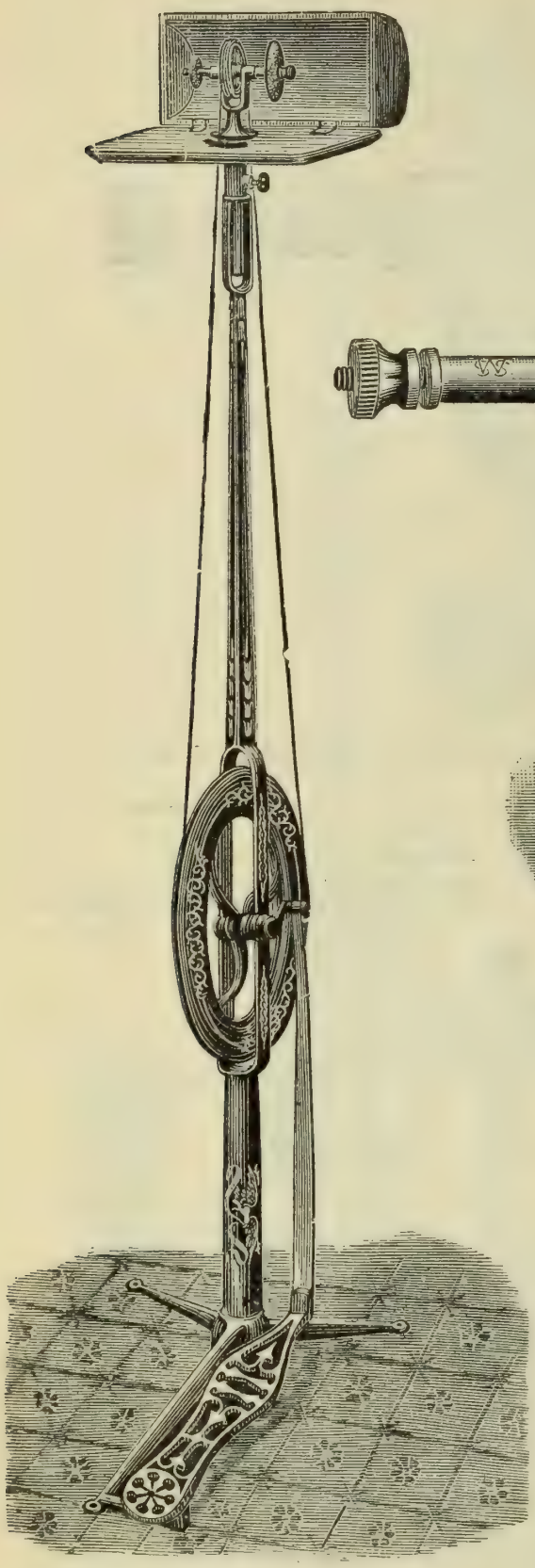
PRICES.

Chucks Nos. 1, 2, 3 .	each $0.15	Chuck No. 6 . .	each $0.40
" No. 4 .	" .25	" " 7 . .	" .50
" " 5 .	" .50	" " 8 . .	" .60

For additional Chucks for Unique and Office and Laboratory Lathes, see pages 37 and 38.

THE S. S. WHITE DENTAL OFFICE LATHE.

No. 1.



Office Lathe-Head.

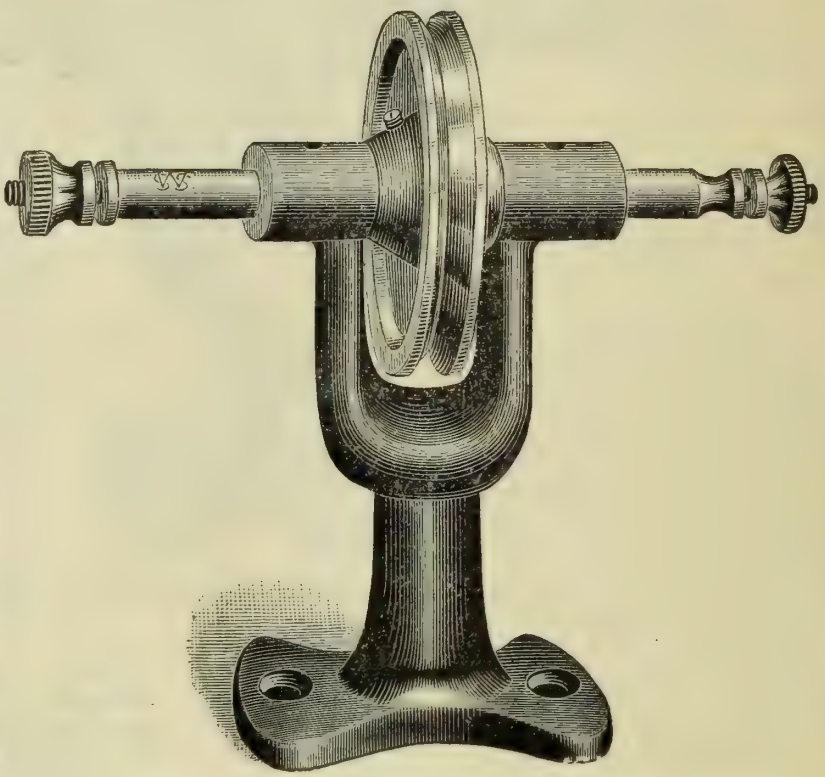


Illustration is about two-thirds actual size.

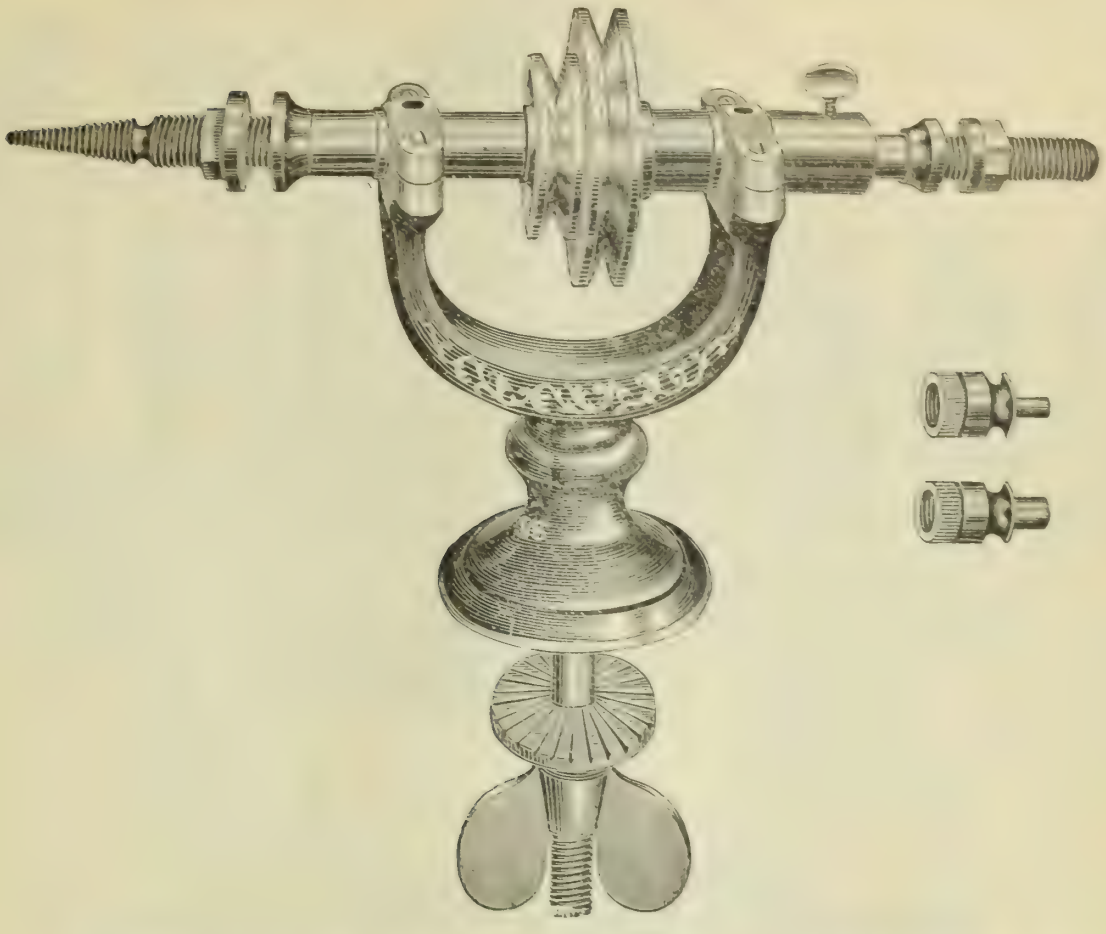
Height, from table to top of pulley, 4 inches; length of spindle, 4½ inches.

No. 1 is a light, though substantially built, lathe designed for office work; such as grinding a crown or polishing small pieces of bridge-work, etc. A spring-pitman holds the wheel-crank off center and the pedal in place for starting when the lathe is at rest. The diameter of the driving-wheel is 10 inches.

The pulley-head and table may be raised 4 inches, and secured by the set-screw. The corundum wheels sold as part of the outfit are Nos. 00, 3, 5, square edge; Nos. 1, 2, round edge, and the articulating wheel.

Price of Lathe, with a set of six Corundum Wheels . .	$20.00
Boxing	.75
Head separately, without Chucks	3.00

THE LAWRENCE LATHE-HEAD.



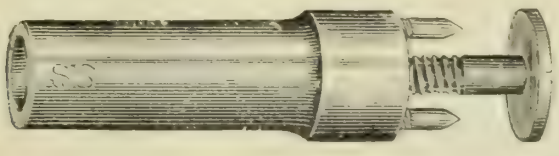
The Lawrence is not a new Lathe-Head. It has a long-established reputation for efficiency that some of the more recent models have failed to gain.

This Head is constructed on the same general lines that has made it popular for a quarter of a century. Frame of iron, spindles of steel. The spindle, including slip-mandrel, is 10 inches long; together they afford the means of carrying three wheels and one cone, thus enabling the operator to put a case through the several stages of finishing without being obliged to change wheels. Two brass Chucks, which accompany the Lathe, can be used to carry corundum wheels for "grinding up."

Price, Lathe-Head, with two Chucks, as shown . . . $7.50

FELT-WHEEL CHUCK No. 9.

Suggested by F. E. POMEROY.

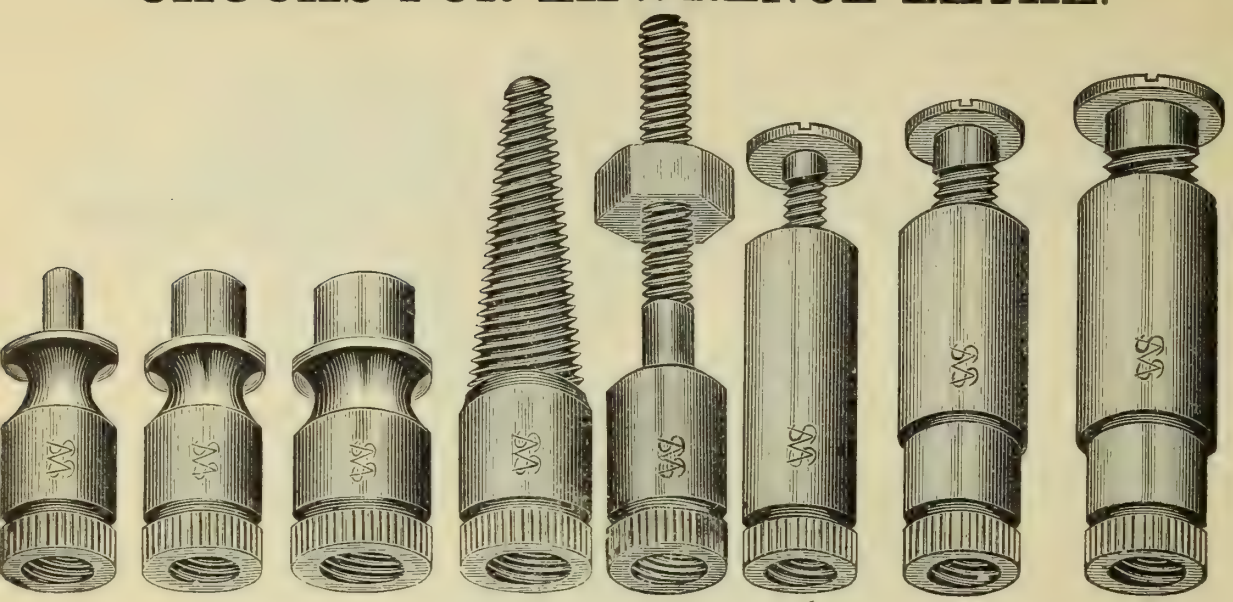


This Chuck, made of brass, is provided with steel pins, which prevent the wheel from revolving on the Chuck.

Adapted to the Unique, Office, and Laboratory, and Lawrence Lathes. In ordering, specify the Lathe for which it is desired.

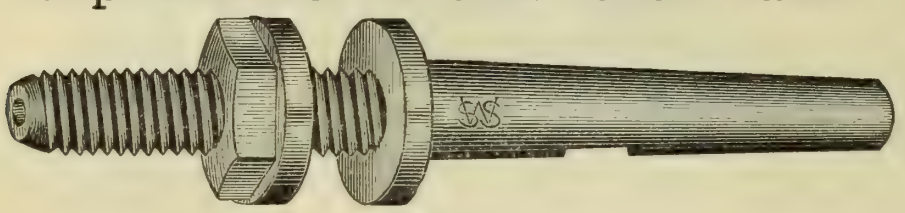
Price . . . . . each $0.50

CHUCKS FOR LAWRENCE LATHE.



These brass Chucks fit the slip-mandrel of the Lawrence Lathe-Head. Nos. 1, 2, 3 are for corundum wheels which are to be fastened with shellac. No. 4 is for brush and felt wheels and cones. No. 5 is adapted for cotton wheels, etc. Nos. 6, 7, 8 are screw-chucks for corundum wheels. Nos. 1 and 6 are for wheels Nos. 00 to 4. Nos. 2 and 7 carry wheels Nos. 5, 6, 7. Nos. 3 and 8 wheels Nos. 8, 9, 10.

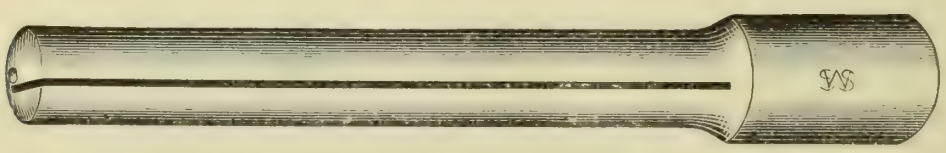
Slip-Mandrel for Lawrence Lathe.



PRICES.

Slip-Mandrel for Lawrence Lathe, with Nos. 1 and 2 Chucks .	each	$1.30	
" " only .	each	$1.00	Chucks Nos. 5, 7 . .	"	.50
Chucks Nos. 1, 2, 3 .	"	.15	" No. 6 . .	"	.40
" No. 4 . .	"	.25	" " 8 . .	"	.60

Lathe-Arbor for Sand-Paper, etc.

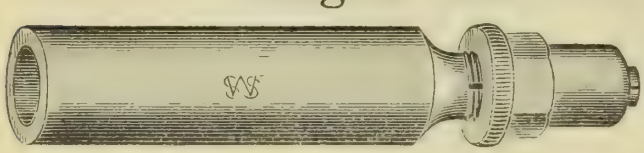


This Arbor is made of brass. After cutting the sand, emery, or other paper to proper size, say two and one-half inches square, one edge of it is slipped into the groove and the paper is wrapped around the Arbor. It will be held in place by the motion of the Lathe.

Made to fit our Unique and Office and Laboratory Lathe-Heads, Slip-Mandrel of the Lawrence, and mandrel No. 4 for the Clutch Lathe-Head. In ordering, specify the Lathe on which it is to be used.

Price . . . . . each $0.30

Engine-Bit Chuck No. 10.

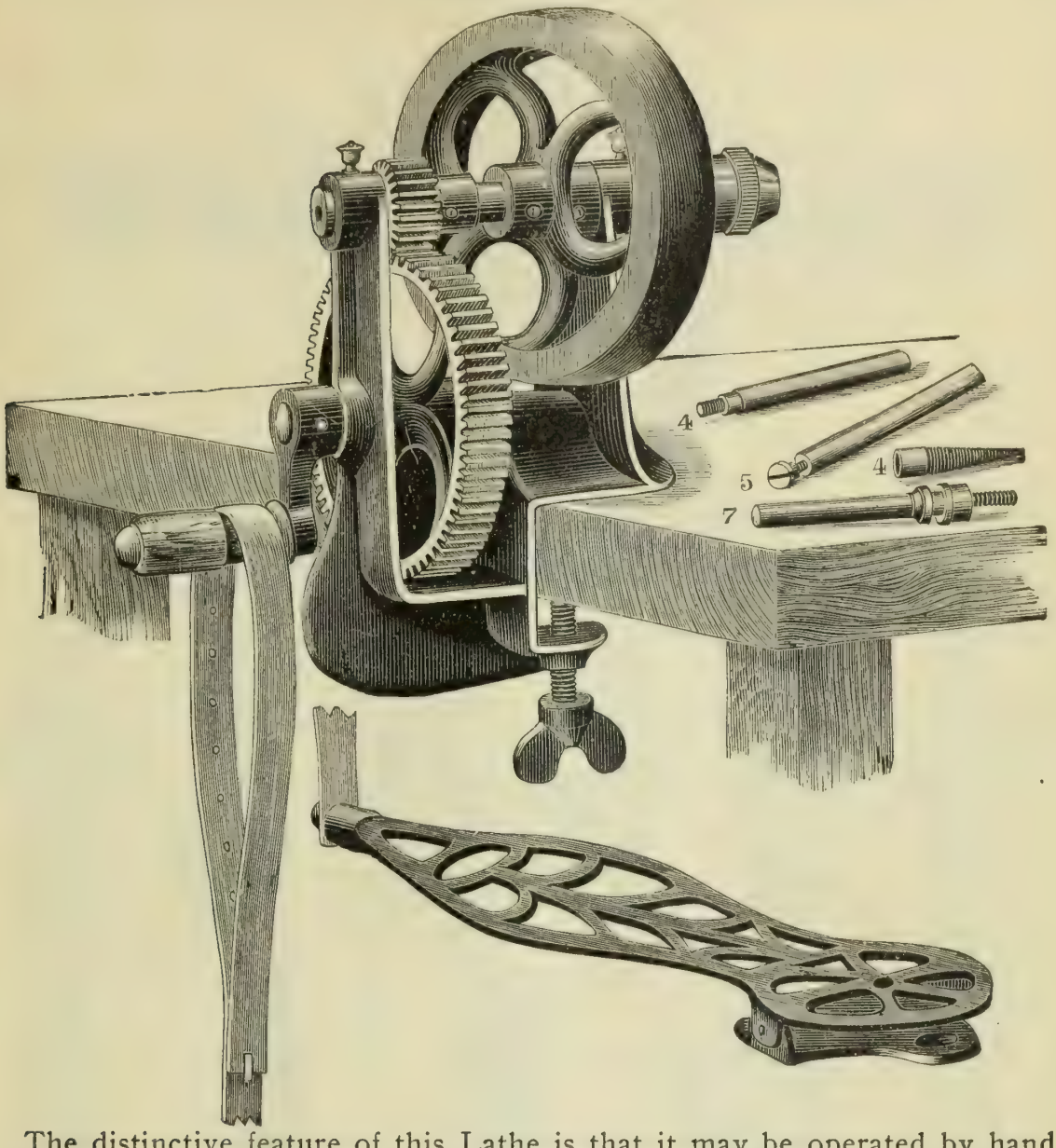


No. 10 is a split Chuck for carrying Engine-Bits. It is adapted to our Unique and Office and Laboratory Lathes. If desired for bits carried by No. 6 Hand-Piece, please specify.

Price . . . . . each $1.00

CONE-JOURNAL HAND- AND FOOT-LATHE.

Patented April 18, 1882.



The distinctive feature of this Lathe is that it may be operated by hand or foot. It supplies a demand for a *portable* Lathe which shall be capable of doing light or heavy work.

The spindle has a coned bearing, and carries a chuck, split at both ends, which acts as a double clamp for holding the mandrels.

The three Mandrels and one Chuck illustrated accompany the Lathe.

Traveling dentists will find this Lathe a valuable addition to their outfit; it can be packed in a space 5 x 6¾ x 13 inches. Weight about eight pounds.

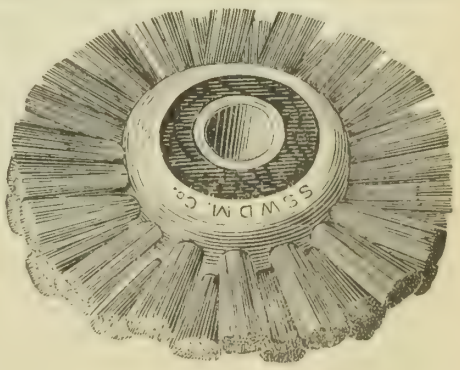
Mandrel No. 4 will carry any of the chucks for Office and Laboratory Lathes; No. 5 is suitable for corundum wheels; No. 7 is for large corundum wheels, brush wheels, cotton wheels, etc.

Taper-Chuck No. 4 will fit No. 4 Mandrel.

Price $7.00

LARGE WIRE WHEEL.

Suggested by Dr. J. M. Whitney.

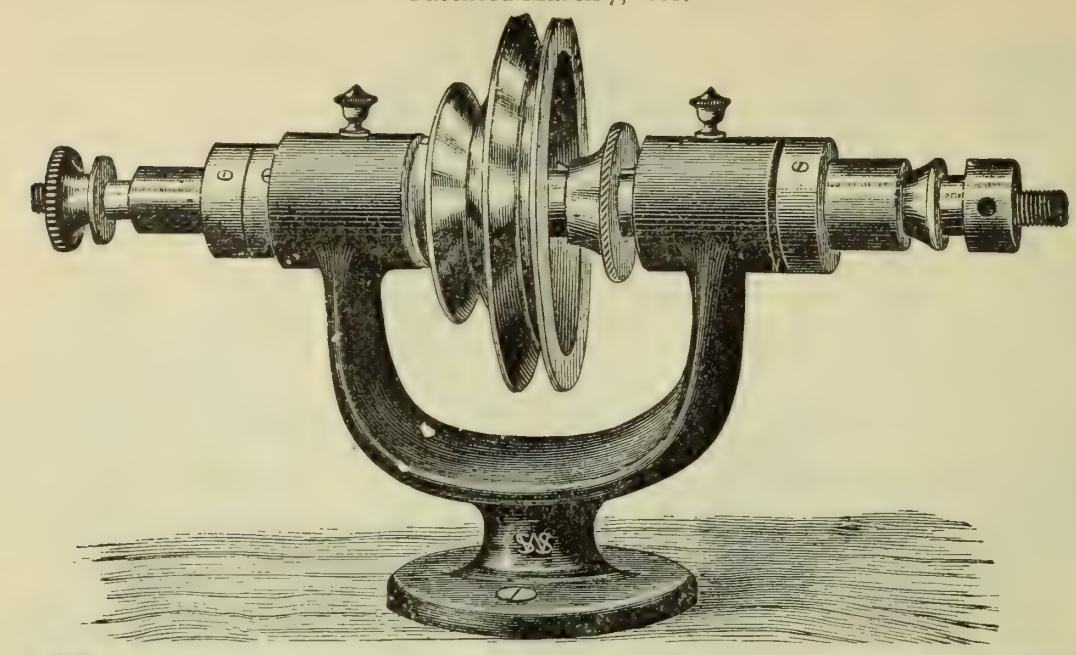


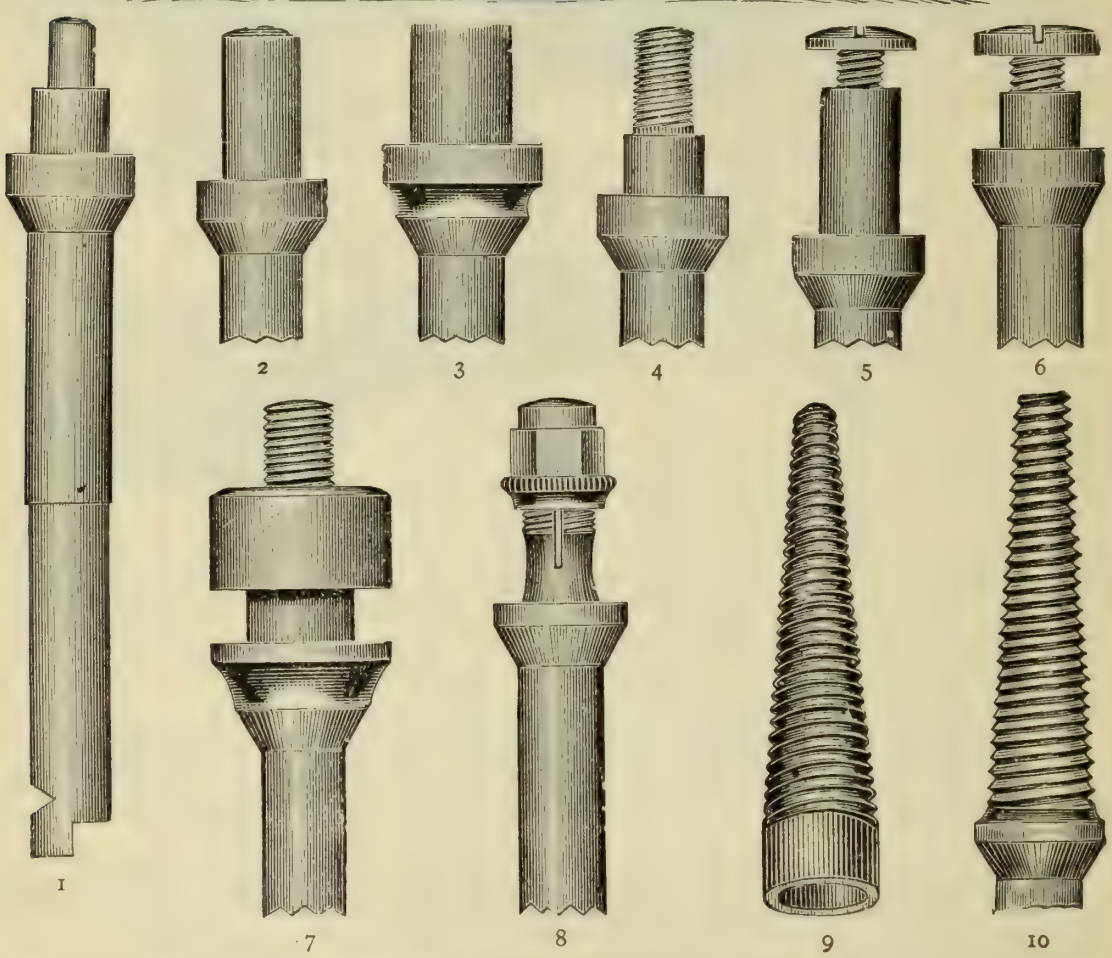
For cleansing engine tools (burs) and files, and dressing down celluloid and rubber plates. It is shown full size; 1⅝ inches in diameter, two rows of fine steel wire.

Price . . . each $0.50

CLUTCH LATHE-HEAD, WITH CONE-JOURNALS AND CONE-MANDRELS.

Patented March 7, 1882.





The Clutch Lathe-Head has practically demonstrated its superiority for dental laboratory purposes by years of successful, satisfactory use.

It runs true. It is carefully made, and both the Spindle and the Mandrels have long bearings, which, being cone-journaled, take up lost motion from wear by simply tightening the screw-collar.

It is adjusted quickly. The Mandrels, being held by a latch operated by a sliding collar working upon a cam, can be inserted or removed in an instant.

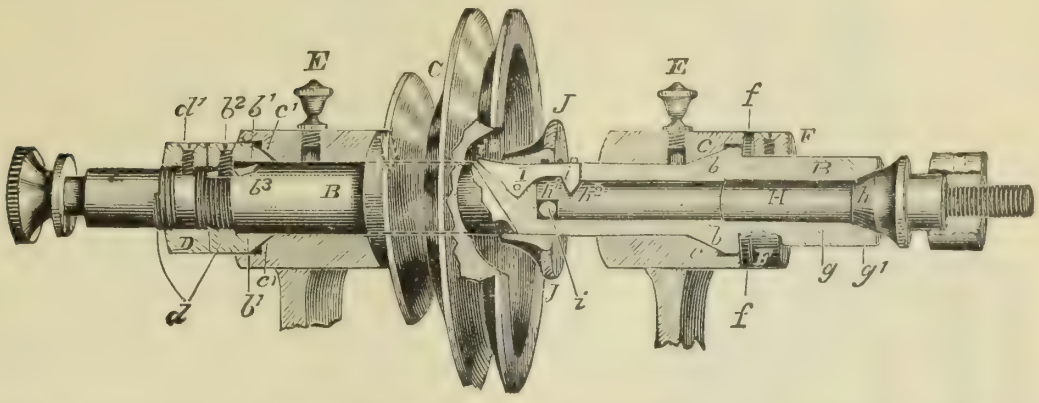
It is durable. The construction throughout is substantial, and gritty particles have little opportunity to work into the bearings and cut them out.

The pulley-grooves at bottom are $1\frac{5}{16}$ and $2\frac{1}{4}$ inches diameter.

All the bright parts are nickel-plated; the frame-work japanned.

We supply a complete set of Mandrels, but those who have our Chucks for the Lawrence, or Office and Laboratory Lathes need only No. 4 of the Clutch set. In ordering No. 4, specify whether it is desired for Lawrence or Office and Laboratory Chucks.

Clutch Lathe-Head, with Cone-Journals and Cone-Mandrels.



The spindle *B* is provided with cone-journals *b*, b^1 (the first fixed, the second movable) which fit corresponding cone-seats in the bearings *c*, c^1. The journal b^1 is formed by a cone-collar, which is adjustable longitudinally upon the spindle to take up wear of either the spindle, its bearings, or the chucks, by means of the screw-ring *D*. The screw-ring works on threads cut in the spindle, and is held in position by the set-screw d^1. The collar is prevented from turning upon the spindle by the guide-screw b^2, which passes through the collar into the groove b^3.

The bit *H* has a conical shoulder at its outer end, which fits in a corresponding seat in the spindle. The inner end is cut partly away to pass the carrier-pin i^1, and provided with a groove h^2, into which the wedge-end *i* of the pivoted latch *I* drops. The latch is then locked by sliding up the collar *J* (which while round outside is an eccentric inside) until its eccentric recess is over the raised portion, and then turning it either way till it binds. In sliding the collar upon the latch make sure that the file-cut nick in the collar-rim is exactly over the latch.

An adjustable collar *F* holds a leather washer over the annular shoulder formed by the bearing *c*, effectually preventing the entrance of gritty particles to cut the bearing out. The oil-holes are covered with nickel-plated screw-caps *E*, *E*. All the bright parts are nickel-plated; the frame-work japanned.

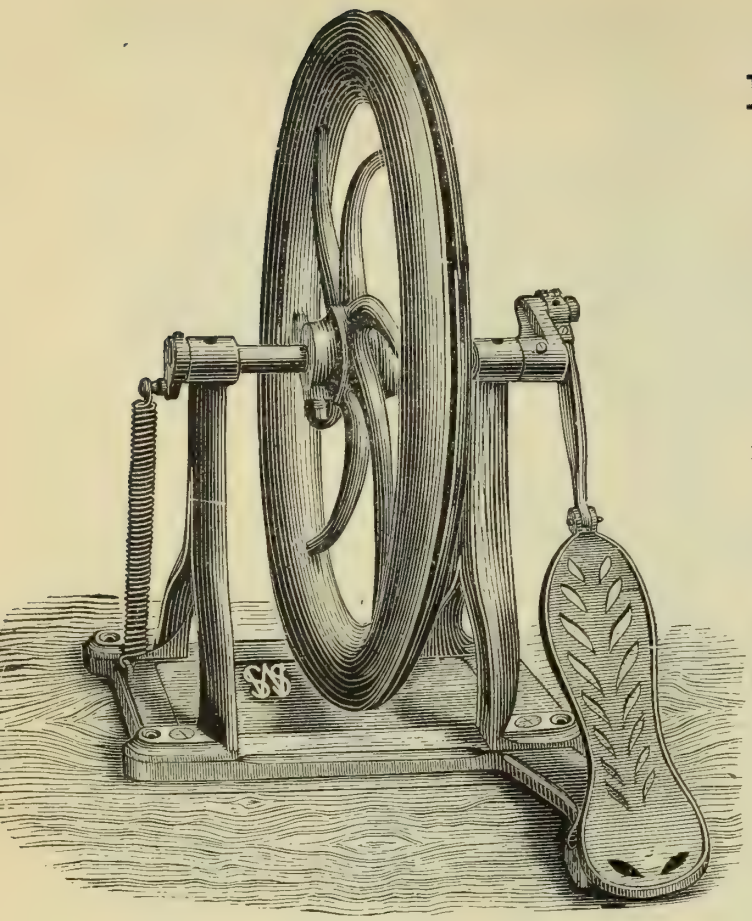
Mandrel No. 1 will carry corundum wheels Nos. 00 to 4 } the wheels to be
" " 2 " " " " 5, 6, 7 } shellacked to the
" " 3 " " " " 8, 9, 10 } chucks.
" " 4 " any of the Laboratory Lathe-Chucks, page 35.
" " 5 " corundum wheels Nos. 5, 6, 7, ½ inch thick and over.
" " 6 " corundum wheels Nos. 5, 6, 7, ¼ inch to ½ inch thick.
" " 7 " large corundum wheels Nos. 8, 9, 10; brush wheels, cotton wheels, etc.
" " 8 " engine-bits (please state for which Hand-piece).
" " 9 " screw-cone, left-hand thread, for the left side of Lathe, for brush wheels, felt wheels, cones, etc.
" " 10 " screw-cone, for right-hand side of Lathe, for brush wheels, felt wheels, cones, etc.

PRICES.

Head, complete, with 10 Mandrels	$13.00

PARTS SEPARATELY.

Head, without Mandrels	$9.00
Mandrels Nos. 1, 2, and 9 . . . . . each	.25
" No. 3 . . . . . "	.35
" " 4, with thread for Laboratory Lathe-Chucks, page 35 . . . . . each	.30
" " 4, with thread for Lawrence Lathe-Chucks, page 35 . . . . . each	.30
" Nos. 5 and 6 . . . . . "	.45
" " 7 and 10 . . . . . "	.60
" No. 8 . . . . . "	1.00



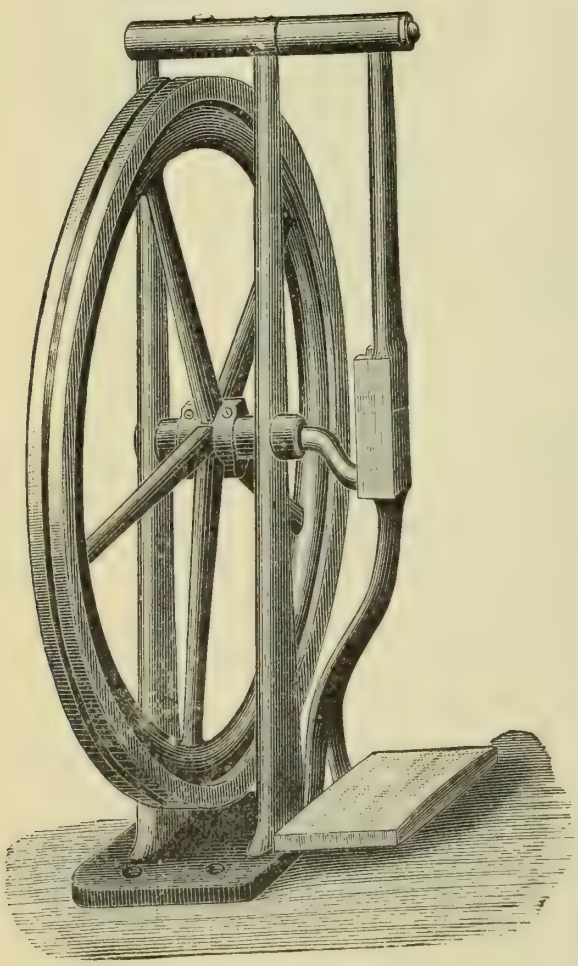
Lawrence Driving-Wheel No. 1.

The Lawrence Driving-Wheel scarcely needs an introduction. Many other models have been introduced and are almost forgotten, but the "old Lawrence" still has its admirers. Few Wheels run as easy—none easier—and none are made any better.

The Wheel (18½ inches in diameter) is balanced by a spiral spring, and responds quickly to the slightest pressure on the pedal.

The Wheel complete occupies a floor space of 21 x 14½ inches. Weight 63 pounds.

Driving-Wheel No. 1	$12.00
Boxing Wheel	1.00



S. S. White Driving-Wheel No. 4.

The S. S. White Driving-Wheel No. 4 is of entirely different design from those we have heretofore offered, and affords any required amount of power with very slight exertion.

The treadle is of the pendulum type, with a foothold which can be worked from either side, sitting or standing. It may be reversed from the position shown and the frame attached to the under side of the lathe-table.

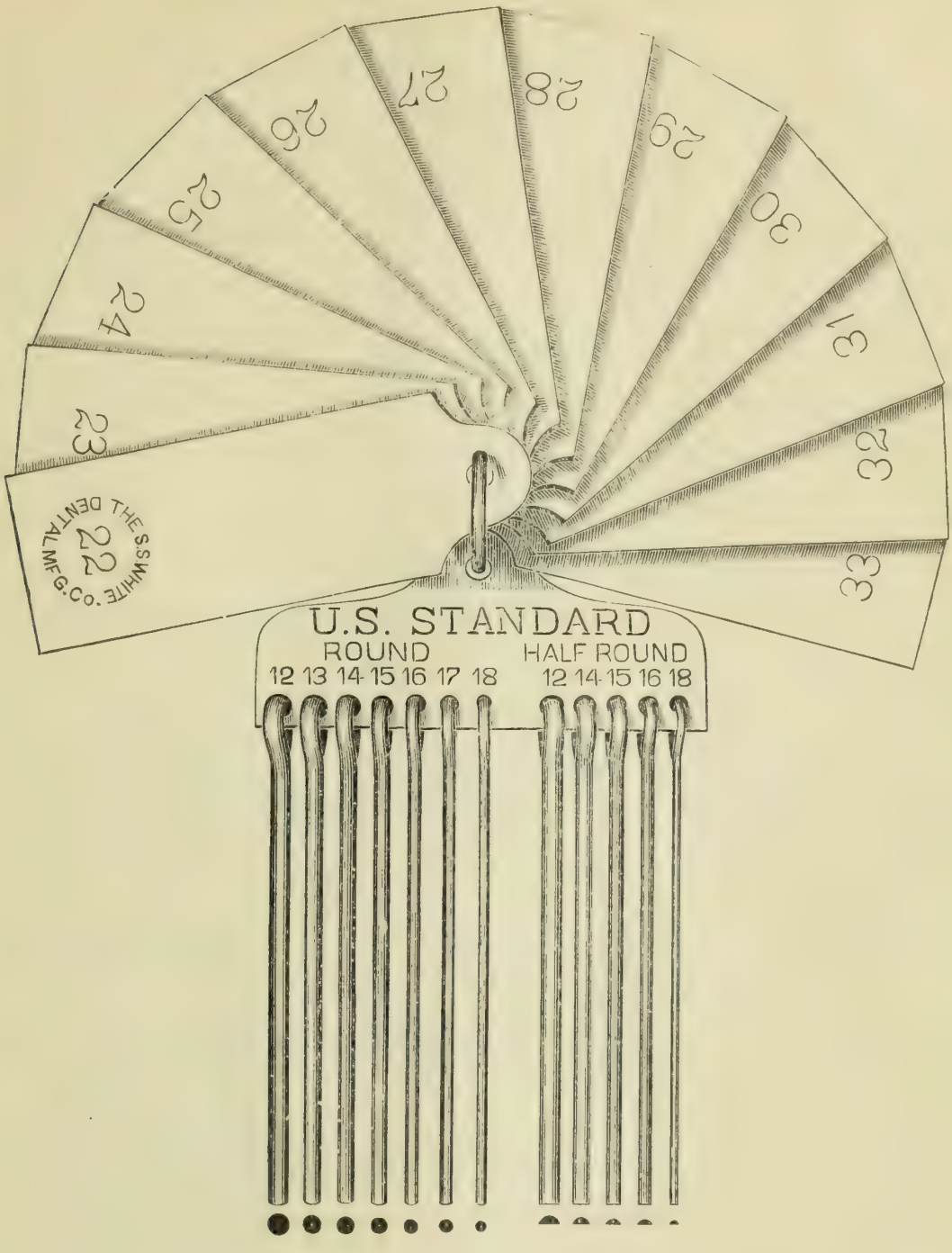
The crank is forged with the shaft from a single piece of steel, and supplied with a roller which works in guides on the treadle-shaft.

The hub of the fly-wheel is split and secured to its shaft by a clamp, thus avoiding the use of set-screws with the chance they afford of marring and springing the shaft.

The diameter of the wheel is 21 inches, and its weight about 38 pounds; total weight of wheel and frame about 68 pounds.

Price (Crated)	$10.50

PLATE AND WIRE GUIDE.



This is not a gauge, but a guide to facilitate the selection of plate and wire by dentists. It shows, by actual samples, numbered according to the United States Standard Gauge, the sizes of wires—round and half-round—and thicknesses of plates commonly used in the dental laboratory, affording an ample range for almost any operation.

The dentist who has one of these Guides has at all times the assistance of accurate examples in selecting the proper thickness of wire or plate for a given operation, and, having determined this, has only to order by the number chosen.

The convenience of the Plate and Wire Guide and its cheapness will doubtless create a large demand for it.

Price . . . . . each $0.40

CORUNDUM WHEELS, CONES, AND CUPS.

These various forms of Wheels, etc., are made from very carefully selected Corundum. Equal care is observed in its preparation and in the manufacture of the articles. We believe they have more abrasive power than any others on the market. In grinding porcelain, glass, minerals, iron, or steel, they cut rapidly and smoothly; **and, if used wet and no grease is allowed to come in contact with them,** will hold their abrasive power to the last. They are made of various grits adapted to different purposes.

The list on the next page represents the sizes of the Wheels carried regularly in stock. We have molds for making larger Wheels of various thicknesses for mechanical purposes.

Careful tests have proved that Corundum Wheels and Disks, properly made of selected crystals, will do more effective work and wear longer than any other similar combination of materials.

No other mineral, except the diamond, will cut porcelain teeth as rapidly as Corundum when properly used. For a light touch for a moment, a dry wheel may be used, **but for continuous work wheels and disks should never be run dry.**

All our Corundum appliances are made from selected crystals. We never buy powdered Corundum, as it is likely to contain impurities that would materially lessen the cutting quality and durability of the instruments.

We carry in stock Corundum Wheels, etc., in three grits, known as Fine ("B"), Medium ("C"), and Regular ("D").

"B" is for fine jointing,

"C" for ordinary work.

"D" for rapid and rough cutting.

Orders should specify "Fine," "Medium," or "Regular," or state the letter of grit desired.

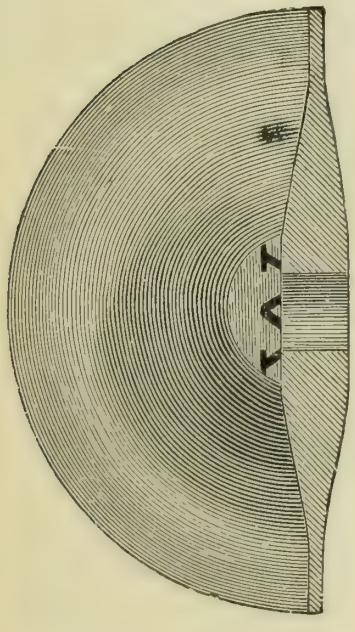
PRICE LIST OF CORUNDUM WHEELS.

[SEE OPPOSITE PAGE.]

No.	Diameter.	THICKNESSES OF WHEELS IN INCHES.					
		¼	⅜	½	⅝	¾	1
00	¾ inch	$0.05					
0	⅞ "	.05					
1	1 "	.06	$0.10	$0.12	$0.14	$0.16	$0.20
2	1⅜ "	.12	.14	.16	.18	.20	.24
3	1⅝ "	.15	.17	.20	.22	.25	.30
4	1¾ "	.18	.22	.25	.28	.32	.40
5	2⅛ "	.20	.25	.30	.35	.40	.50
6	2½ "	.25	.30	.35	.40	.45	.55
7	3⅛ "	.40	.50	.60	.70	.80	1.00
8	4 "	.60	.75	.90	1.00	1.10	1.25
9	5 "	.80	1.00	1.20	1.35	1.50	1.60
10	6 "	1.00	1.25	1.50	1.75	2.00	2.50
11	7 "	1.25	1.60	1.95	2.30	2.65	3.35

The ¼-inch Wheels Nos. 0 to 7 are made both round and square edge. All others square edge only.

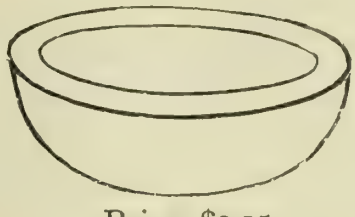
Articulating.



Diameter, $2\frac{3}{16}$ inches; thickness of cutting-edge, $\frac{1}{16}$ inch.

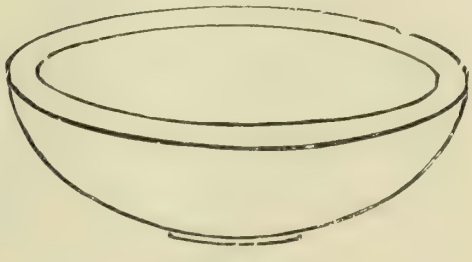
Price, each $0.20

Small Cup.



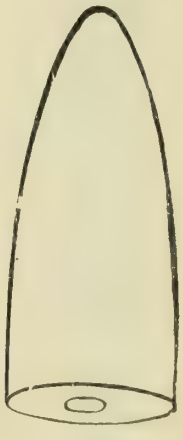
Price, $0.15.

Large Cup.



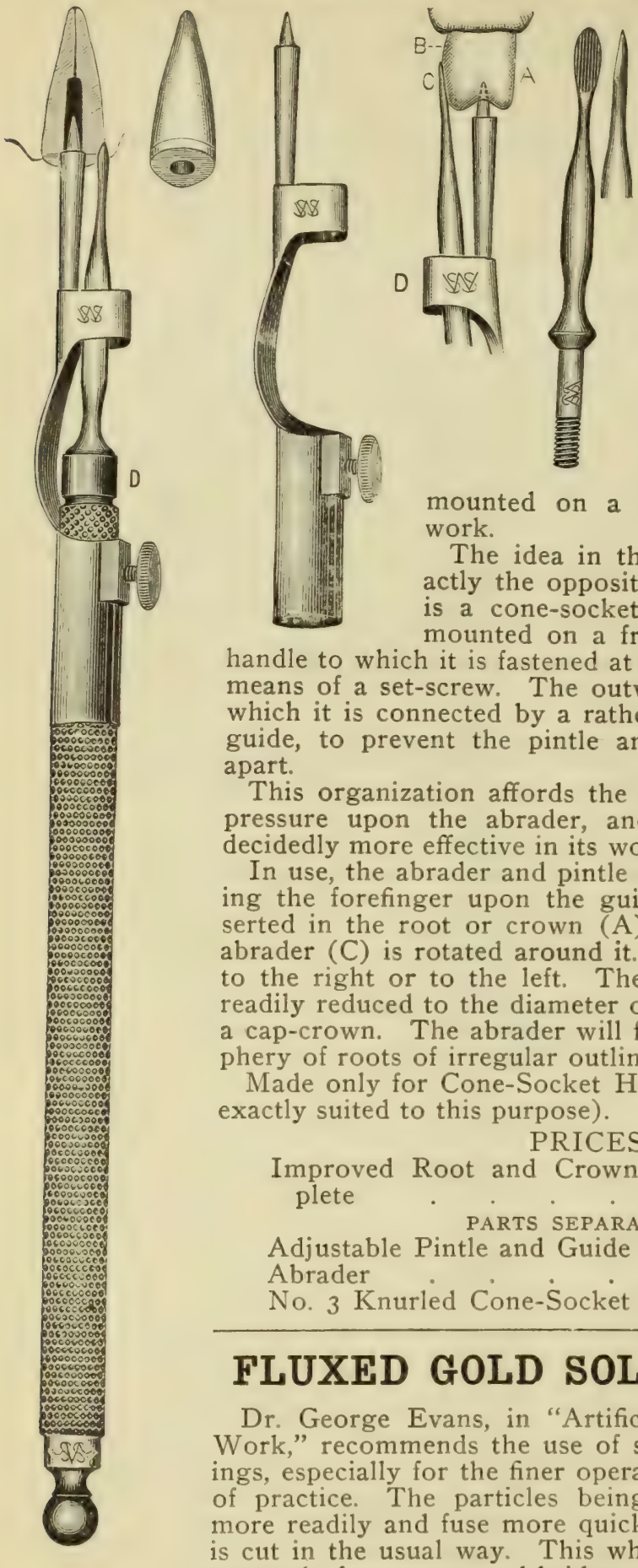
Price, $0.20.

Cone.



Price, $0.15

IMPROVED ROOT AND CROWN REDUCER.



The improvements made by Dr. How in his well-known Root Reducer provide for more rapid work than was possible in the old form. The reason for this is apparent from an inspection of the illustrations. In the old form, the pintle or centering point was screwed into a cone-socket handle, and the abrader, which revolved around this, was mounted on a spring to hold it to its work.

The idea in the improved device is exactly the opposite of this. The abrader C is a cone-socket point, and the pintle is mounted on a frame which slips over the handle to which it is fastened at the desired adjustment by means of a set-screw. The outward end of the frame, to which it is connected by a rather stiff spring, serves as a guide, to prevent the pintle and abrader from twisting apart.

This organization affords the means for a much firmer pressure upon the abrader, and consequently makes it decidedly more effective in its work.

In use, the abrader and pintle are forced apart by pressing the forefinger upon the guide (D), the pintle is inserted in the root or crown (A) to be trimmed, and the abrader (C) is rotated around it. The abrader cuts either to the right or to the left. The side of a crown can be readily reduced to the diameter of the neck (B) to receive a cap-crown. The abrader will follow and dress the periphery of roots of irregular outline.

Made only for Cone-Socket Handles (No. 3 Knurled is exactly suited to this purpose).

PRICES.

Improved Root and Crown Reducer, complete	$1.75

PARTS SEPARATELY.

Adjustable Pintle and Guide	1.15
Abrader	.45
No. 3 Knurled Cone-Socket Handle	.15

FLUXED GOLD SOLDER FILINGS.

Dr. George Evans, in "Artificial Crown- and Bridge-Work," recommends the use of solder in the form of filings, especially for the finer operations of that department of practice. The particles being smaller take the heat more readily and fuse more quickly than when the solder is cut in the usual way. This which we offer is prepared expressly for crown- and bridge-work, and has the proper quantity of flux properly distributed throughout the mass.

Put up in one dwt. bottles.

PRICES.

Fluxed Solder Filings, 18-k.	per dwt. $1.00
" " " 20-k.	" 1.10

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THE BEST ANTISEPTIC.

LISTERINE.

Invaluable to the Dental Practitioner.
Indispensable for the Dental Toilet.

To Cleanse and Deodorize before Operating.
To Wash and Purify the Mouth after Extracting.
To Treat Antiseptically all Diseases of the Oral Cavity.
To Prescribe as a Detergent Prophylactic Mouth-wash.

Listerine is a perfect tooth and mouth-wash, and has received the Highest Recognition as the Best General Antiseptic for a

DENTIST'S PRESCRIPTION.

☞We shall be pleased to send you our new and complete pamphlet of 40 quarto pages, embodying full and exhaustive reports of the Antiseptic value and utility of Listerine.

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ST. LOUIS, MO., U. S.

British, French, German, Spanish, and Canadian Trade constantly supplied.

Schieffelin's COCAINE DISCOIDS.

A New, Safe, and Convenient Means of Producing Local Anesthesia.

The Cocaine Discoids prepared by us consist of the pure hydrochlorate of cocaine of our own manufacture, without admixture of foreign material to impair its activity, as in the ordinary hypodermic tablets. The quantity of the drug in each Discoid is definitely determined by weight, the amounts suitable for ordinary doses being selected,—namely, 1/8, 1/5, and 1/4 grain,—and, owing to their method of manufacture, not being compressed, the Discoids are readily soluble, dissolving in one drop of water. These advantages of the Discoids over all other methods of employing cocaine insure not only safety, but convenience of application. Before or during the course of an operation a solution of cocaine of any desired strength can be prepared at a moment's notice, and the quantity injected is always known, and not a matter of conjecture.

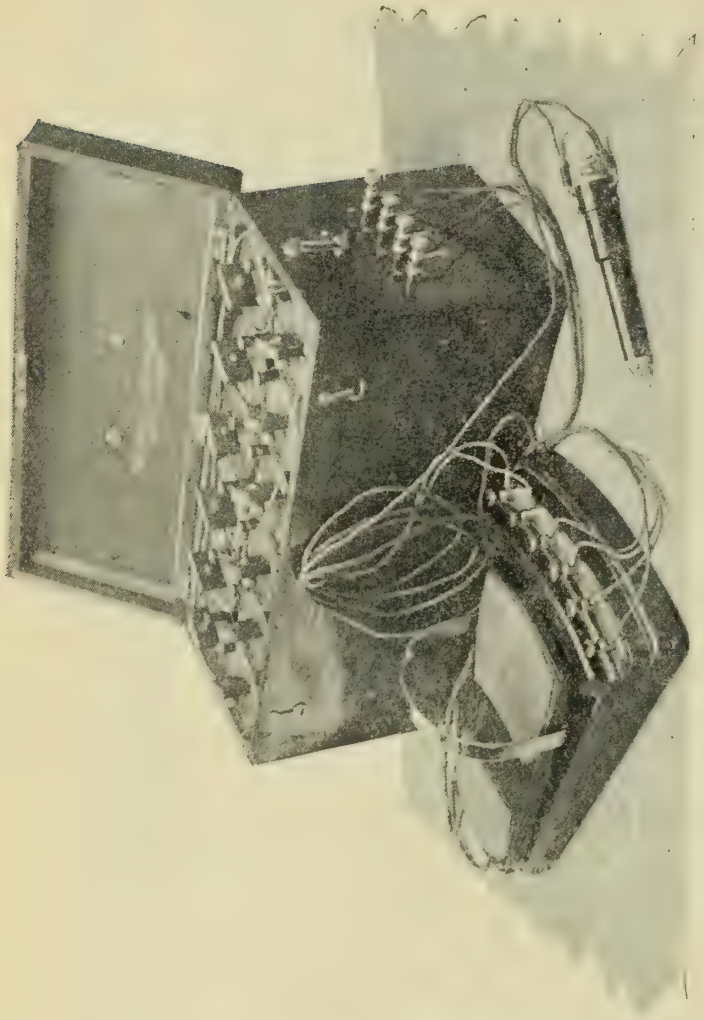
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This College has accepted the requirements of the National Association of Dental Faculties. All students admitted and graduated will be under these rules.

The College possesses means for thorough training theoretically and practically in all branches of dentistry.

The building, which is new, contains all modern conveniences. There are three floors with over ten thousand square feet of floor space, and over sixteen hundred square feet of window space.

The Spring Course commences April 13. The fee charged for this course will be credited upon the fee for the regular session.

The Fall Course will commence September 10, and will be free to those matriculating for the regular session.

The Regular Session will commence October 1.

FEES.

Matriculation, paid but once	$5.00
Tuition fee	100.00
Dissecting fee	10.00
Diploma fee	30.00

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Incorporated by the Legislature of the State of New York in 1865.

Thirty-Second Collegiate Year.

The collegiate year work of 1897-98 will consist of Infirmary practice from June 4, 1897, to June 2, 1898, and a lecture session of eight months, from October 4, 1897, to June 2, 1898.

Registration for the Lecture Session of 1897-98 closes October 14, 1897.

Applicants will be admitted to the lecture session of 1897-98 as DEGREE, SPECIAL, or SESSION STUDENTS.

1. DEGREE STUDENTS, those who matriculate toward the degree of the college having the admission preliminary education for the degree of D.D.S. required by the New York state dental law.

a. No admission preliminary education required of those graduating in 1898 or 1899 who were matriculated in a registered dental college prior to January 1, 1896; they are also admitted, without restriction, to the license examination of the state of New York.

b. Those graduating in 1899 or 1900 who were matriculated in a registered dental college between January 1, 1896, and January 1, 1897, have to have 24 academic counts or their equivalent, or have to secure the same,—for those graduating in 1899, before October 1, 1897; for those graduating in 1900, before October 1, 1898.

c. All matriculating after January 1, 1897, having credentials of having had a preliminary education equivalent to the academic diploma of a High School or Academy of the state of New York.

2. SPECIAL STUDENTS, those who, without the admission preliminary education of either 1896 or 1897, matriculate, but not toward the degree, attend the college, FREE OF CHARGE, pending the securing of the required admission preliminary education and with their special student period credited as pupilage only. Their studies toward the degree will commence on the date that they are entitled to matriculate as "Degree Students."

3. SESSION STUDENTS, those who, without the admission preliminary education, matriculate, but not toward the degree, and pay the fees of the session. They are eligible to the examinations and the certificate of the session; said certificate will admit them to advanced standing in all dental colleges belonging to the National Association of Dental Faculties.

A graduate of a dental college out of the State of New York is not admitted to the denta license examination of the State of New York unless he has fulfilled the admission preliminary education requirements of "Degree Students" as stated above.

For further information, send for an announcement of 1897-98 and a copy of "Form I" of the college, addressing

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CONDITIONS OF ADMISSION.

Candidates for admission are required: First, to write an essay (not exceeding a page of foolscap) as a test of orthography and grammar. Second, to pass an examination in the English branches, viz: grammar, arithmetic, history, and geography.

A candidate who has received a collegiate degree or passed the matriculate examination of a recognized college, or who has a certificate from a normal, high, or grammar school, or a teacher's certificate properly attested, may enter without examination.

N. B.—Special attention is called to the rule adopted by the National Association of Dental Faculties, August, 1895, requiring all applicants for matriculation to be present and enter their names not later than the tenth of October. This rule applies equally to students entering the second and third year classes.

FEES.

Matriculation Fee (paid once only) .	$5.00	Dissecting Fee (Second Year) . .	$10.00
Fee for One Course of Lectures .	100.00	Graduation Fee (Third Year) . .	30.00

Board can be obtained at from five to eight dollars per week, according to location and accommodations.

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The Dental Department enters upon the present session in "Dental Hall," the new building especially erected for its use. The facilities thus afforded are, it is believed, unequaled for securing an education complete in all departments of dental science and art. The clinical operating room is 180 by 50 feet, lighted on all sides, and furnished with 100 Wilkerson Chairs of latest pattern, especially constructed for the Department. Each operating chair has a fountain spittoon attached, also especially designed and constructed for this Department. Electrical service is supplied to all of the chairs, and is of a character to cover all of the applications of electricity to dentistry. The Prosthetic Department is supplied with laboratory facilities devoted to every branch of the work. Prosthetic technic, in vulcanite and metal work, porcelain work, continuous-gum work, and crown- and bridge-work, is taught by modern methods in separate laboratories especially equipped for the purpose. The laboratories are furnished with power lathes and with compressed-air apparatus for soldering and metallurgical operations.

The clinical patronage of the Department is always in excess of the needs of the students.

Oral surgical clinics, also general surgical clinics, are held twice a week.

Practical instruction in Chemistry, Histology, and Bacteriology is given in appropriately equipped laboratories.

The Dissecting-Room is large, well lighted, thoroughly ventilated, and is furnished with ample material for the successful prosecution of anatomical studies.

The technic or manual-training method of imparting instruction is developed in relation to all departments where it has been found applicable.

All of the departments of practical laboratory and clinical instruction are in charge of competent and experienced demonstrators, who are ably assisted in the work of instruction by a full corps of expert assistants.

The Dental Department of the University is an integral part of the University system. Its students are eligible to and participate in all those features of University life common to the whole student body of the institution. These include its athletic features and privileges of the Howard Houston Hall, the club house of an organization governed by the University students and having all of the appointments and desirable features of a strictly first-class club. The Dormitories of the University are the best of their kind in this country, and to these the students of dentistry are admitted in common with the students of all the other departments.

THE REGULAR OR WINTER SESSION.

The session begins October 1, and ends at Commencement, early in June. The number of lectures per week, with a synopsis of the various branches taught, will be found in the General Catalogue.

In order to facilitate work in the practical departments, the regular winter session is so arranged that the first-course student is required to divide the morning hours equally between DENTAL TECHNICS, HISTOLOGICAL, AND CHEMICAL LABORATORY WORK.

During the second and third years the student has the entire forenoon of each day for practical dental work. Ample opportunity is thus afforded for practice in operative and prosthetic dentistry. The first-year classes are divided into sections, the time not otherwise engaged being devoted to practice in the operative and mechanical rooms.

This plan of GRADING THE COURSE, and of affording the first and second year students an opportunity of coming forward for examination in certain branches, not only proves an economical arrangement of their time, but greatly facilitates their labors in the acquirement of knowledge in the remaining branches.

PLAN OF EXAMINATIONS.

Attendance upon three regular courses of lectures will be required before the student can take the final examination for the degree of Doctor of Dental Surgery.

At the close of the first year, final examinations are held in CHEMISTRY AND MATERIA MEDICA, ELEMENTARY ANATOMY, HISTOLOGY, OSTEOLOGY, and MYOLOGY, and in PHYSIOLOGY excepting the Muscular and Nervous Systems. At the end of the second year the student is examined finally upon ANATOMY AND PHYSIOLOGY; and progress in OPERATIVE AND MECHANICAL DENTISTRY; if he is not qualified, a second examination is afforded him at the beginning of the next winter session.

The final examination at the close of the third year is in OPERATIVE DENTISTRY, MECHANICAL DENTISTRY, METALLURGY, BACTERIOLOGY, CLINICAL DENTISTRY, DENTAL PATHOLOGY AND THERAPEUTICS, AND ORAL SURGERY.

All applicants for advanced standing must pass the required examinations of this school, or furnish proof that they have passed EQUIVALENT examinations in some recognized dental or medical school. Graduates of a recognized medical college will be admitted to the second-year class without examination.

For detailed information and announcements, address

EDWARD C. KIRK, D.D.S.,
Dean of the Dental Faculty,
Dental Hall, Cor. 33d and Locust Sts.,
PHILADELPHIA, PA.

Pennsylvania College of Dental Surgery

Eleventh Street, below Spruce, corner of Clinton St.

FORTY-SECOND ANNUAL SESSION, 1897-98.

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C. N. PEIRCE, D.D.S., Professor of Dental Physiology, Dental Pathology, and Operative Dentistry.
WILBUR F. LITCH, M.D., D.D.S., Professor of Prosthetic Dentistry, Materia Medica, and Therapeutics.
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This College has accepted the requirements of the National Association of Dental Faculties with regard to admission and graduation of students. (See announcement for 1897-98, which can be procured from the Dean.)

THE SPRING AND FALL SESSIONS.

THE SPRING COURSE commences on the second Monday in April and continues until June 20. Fee, $50, which will be credited upon the fee for the regular session.

THE FALL COURSE will commence September 6, and continue until the 1st of October, and will be free to those who matriculate for the regular session.

Attendance upon the Spring and Fall Courses will be deemed equivalent to the term of pupilage under a private preceptor.

THE REGULAR SESSION

Will commence on October 1, 1897, and continue until April 6. Twenty lectures will be delivered each week on the various branches taught.

CLINICAL PRACTICE.

Lecture hours excepted, general clinical practice is available for the student continuously through the day. Competent instructors are always present.

GRADUATION IN MEDICINE.

By an arrangement with Jefferson Medical College, such students as may desire to do so can, if found qualified, obtain the two degrees, in Dentistry and Medicine, in five years. Students desiring to graduate in medicine are required to notify the Dean of their intention at the beginning of their second course.

FEES.

Matriculation (paid but once)	$5.00
For each Year (Demonstrators' Ticket included)	100.00
Dissecting Fee	10.00
Diploma Fee	30.00

Board can be obtained at from $4.00 to $6.00 per week.

The instruments and tools required can be procured for from $35.00 to $45.00. This sum does not include the price of dental engine.

For further information, address

C. N. PEIRCE, D.D.S., Dean, 1415 Walnut St., Philadelphia.

The Baltimore College of Dental Surgery.

Chartered by the Legislature of Maryland in 1839.

THE OLDEST DENTAL COLLEGE IN THE WORLD.

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The Baltimore College of Dental Surgery, the first, and for many years the only dental school, offers facilities for the study of dentistry proper, such as age and experience only can give. Its immense museum, complete apparatus, large and well-arranged building, and carefully studied curriculum give to its students great advantages and opportunities, both theoretical and practical, while its age gives its diploma a dignity far outranking all other colleges—a diploma honorably represented in all civilized countries, and held by the most distinguished members of the dental profession.

The fact that dentistry must be practically taught is fully recognized, the College Infirmary, a most complete, large, and handsome hall, being daily filled with clean and respectable patients, of a class nearly equal to those of the average dentist. The Infirmary is open all the year, students paying an entrance fee, which is deducted from those of the regular succeeding course.

The session begins October 1, closing in April. A large corps of demonstrators, always present, put in actual practice the teachings of all lecturers in dentistry—leaving nothing undemonstrated. All methods are fully taught, all appliances and apparatus used; the making of instruments and the most elaborate gold and continuous-gum work, and all the cases arising in ordinary practice, with many which are rarely seen, carefully demonstrated.

Commencing October 1, 1895, women will be admitted to this College, subject to the same requirements as men.

The College has formed an alliance with the College of Physicians and Surgeons by which its students are privileged to attend all lectures and clinics. The patients of this medical school numbered last year over 40,000.

Graduates of the Baltimore College of Dental Surgery are required to attend but one session at the College of Physicians and Surgeons prior to presenting themselves as candidates for the degree of M.D. (See Catalogue.) In accordance with the resolutions adopted by the National Association of Dental Faculties, which go into effect for the session of 1891 and 1892, the qualifications for entering the first year's course are a preliminary examination in the ordinary English branches.

TERMS OF GRADUATION.—Attendance on three winter courses of lectures in this College; as equivalent to one of these we accept one course in any reputable dental college. Graduates in Medicine can enter the Junior Class.

BENEFICIARY STUDENTS.—Each State Dental Society is privileged to send one Beneficiary Student to this College at one-half the regular fees. This has been for some years an established feature of this College.

FEES.—Matriculation (paid once only), $5.00. Tuition fees, $100.00. Diploma fee, $30.00. Dissecting fee, $10.00.

Students corresponding with the Dean will please be careful to give full address, and direct their letters to

M. W. FOSTER, M.D., D.D.S., Dean, No. 9 W. Franklin St., Baltimore, Md.

Dental Department

OF THE

MARION-SIMS COLLEGE OF MEDICINE.

Grand Avenue and Caroline St., St. Louis, Mo.

The Session of 1897-98 begins the latter part of September, and ends the first of April, 1898.

Three terms, of six months each, are required before graduation.

Fees first year	$105.00
Each succeeding year	100.00

For further information, address

Y. H. BOND, Dean,
Grand and Page Aves., St. Louis, Mo.

J. H. KENNERLY, Secretary,
Grand and Page Aves., St. Louis, Mo.

Vanderbilt University,

Department of Dentistry.

THE 18th ANNUAL SESSION

Begins October 4, 1897, and continues six months. The Course of Instruction is graded.

FEES.

Matriculation paid each year	$5.00
Tuition Fees	100.00
Graduation Fee	25.00

REQUIREMENTS FOR GRADUATION

Are those laid down by the National Association of Dental Faculties.

For Catalogue and other information, address

W. H. MORGAN, M.D., D.D.S.,
No. 211 North High St.,
NASHVILLE, TENN.

ESTABLISHED 1845.

Ohio College of Dental Surgery.

DEPARTMENT OF DENTISTRY—UNIVERSITY OF CINCINNATI.

SESSION 1897-98.

FACULTY.

J. S. CASSIDY, A.M., M.D., D.D.S., Professor of Chemistry and Materia Medica.
H. A. SMITH, A.M., D.D.S., Dean of the Faculty, Professor of Operative Dentistry and Dental Pathology.
C. M. WRIGHT, A.M., D.D.S., Professor of Physiology and General Pathology.
WM. KNIGHT, M.D., D.D.S., Professor of Anatomy and Oral Surgery.
GRANT MOLYNEAUX, D.D.S., Professor of Prosthetic Dentistry and Metallurgy.
H. T. SMITH, D.D.S., Assistant Professor of Operative Dentistry.

J. Taft, M.D., D.D.S., Lecturer on Oral Hygiene.
C. I. Keely, D.D.S., Lecturer on Orthodontia.
L. E. Custer, D.D.S., Lecturer on Anesthetics and Dental Electricity.
R. C. Heflebower, M.D., Lecturer on the "Relation of the Eye and Ear to the Teeth."
O. L. Cameron, Lecturer on Bacteriology.

DEMONSTRATORS.

T. I. Way, D.D.S., Superintendent of the Clinic and of Instruction in Operative Technics.
H. A. Whiteside, D.D.S., Demonstrator of Crown- and Bridge-work and Operative Dentistry.
C. P. McLaughlin, D.D.S., Demonstrator of Operative Dentistry and Instructor in Extraction of Teeth.
L. T. Ivins, D.D.S., Demonstrator of Prosthetic Dentistry and Instructor in Prosthetic Technics.
H. C. Matlack, D.D.S., Demonstrator of Anatomy.
W. S. Locke, D.D.S., Demonstrator of Clinical Orthodontia.
A. A. Kumler, D.D.S., Demonstrator of Analytical Chemistry.

The Fifty-second Annual Session begins October 5, 1897, and closes April 5, 1898.

A Spring Course of Clinical Instruction begins April 12, 1898.

A Fall Course of Clinical Instruction begins September 1, 1898.

Fees: Matriculation Fee (payable but once), $5.00; Professors' Tickets for each year (including all Clinical and Laboratory Courses), $100.00; Diploma Fee, $25.00.

For further information and announcement, address

H. A. SMITH, D.D.S , Dean,

or H. T. SMITH, D.D.S., Secretary,

116 Garfield Place, CINCINNATI, O.

BOSTON DENTAL COLLEGE.

563 TREMONT STREET.

1897-8.

FACULTY.

JOHN A. FOLLETT, A.M., M.D., Dean, Professor of Anatomy and Physiology.
EDWARD W. BRANIGAN, D.D.S., Professor of Clinical Dentistry.
GEORGE F. EAMES, M.D., D.D.S., Professor of Pathology and Therapeutics.
HERBERT L. SMITH, A.M., M.D., Professor of Principles and Practice of Surgery.
JAMES H. DALY, D.D.S., Professor of Dental Science and Operative Dentistry.
GEORGE A. BATES, D.D.S., Professor of Dental Histology and Microscopy.
JOSEPH K. KNIGHT, D.D.S., Professor of Dental Art and Mechanism.
GREENLEAF R. TUCKER, PH.G., S.B., Professor of Chemistry and Metallurgy.
WILLIAM A. WHITE, M.D., Professor of Materia Medica.

Professor in Charge of Infirmary.

EDWARD W. BRANIGAN, D.D.S.

Instructors in Clinical Dentistry.

W. P. HOUSTON, D.D.S.
J. W. FORBES, D.D.S.
E. O. KINSMAN, D.D.S.
JAMES R. PIPER, D.D.S.
H. H. PIPER, D.D.S.
S. P. WILLARD, D.D.S.
F. S. FOGG, D.D.S.
WM. RICE, D.D.S.
W. F. BRIGHAM, D.D.S.

Demonstrator in Charge of Mechanical Department.

FREDERIC M. HEMENWAY, D.D.S.

Instructors in Mechanical Department.

F. C. MERRILL, D.D.S. J. ROSS HARDY, D.D.S. E. A. QUINN, D.D.S.

Instructor in Chemistry.

F. H. HOLT, Ph.G.

Instructor in Orthodontia.

GEO. C. AINSWORTH, D.D.S.

Librarian.

GEORGE A. BATES, D.D.S.

The year begins on the second Monday in September and ends on the third Wednesday in June.

It is the object of the Faculty to present a complete course of instruction in the theory and practice of Dentistry; for this purpose a well-appointed laboratory and infirmary are provided, at which there is an ample number of patients, insuring to all students abundant opportunities for operating at the chair and becoming by actual practice familiar with all the operations demanded of the dentist.

The Laboratory and Operating Room are open at 9 o'clock A.M. Demonstrators are present daily during working hours.

Students who began their professional studies elsewhere may be admitted to advanced standing. No student can advance with his class or be admitted to advanced standing until he has passed the required examination on the studies of the previous year.

Every candidate for the degree must have passed a satisfactory examination in every one of the departments of dental instruction at regular periods of the College course.

All candidates for admission are required before examination to produce certificates of good moral character, and students from other colleges are required to bring certificates from those colleges of honorable dismission. For admission they must present a degree in letters, science, or medicine from a recognized college or scientific school, or pass an examination in the following subjects:

(a.) **English.**—The writing of a short essay upon some assigned topic.

(b.) **Geography.**—Such knowledge of this branch as is obtained by the graduate of a high school.

(c.) **History.**—A knowledge of American history.

(d.) **Mathematics.**—1. Arithmetic: Common and decimal fractions; ratio and proportion; percentage; metric system of weights and measures; square root. 2. Algebra: Fundamental operations; factoring; simple equations.

(e.) **Physics.**—Elementary physics (Balfour Stewart, or its equivalent).

(f.) **Electives.**—Any one of the following: Algebra. Latin: Translation of easy Latin prose. French: Translation of short sentences into English. German: Elementary German grammar; translations into English. Botany: Structure of flowering plants.

Candidates from foreign countries must be able to speak the English language.

FEES AND EXPENSES.

For Matriculation	$5.00
For a year	100.00
For Demonstrator's Ticket (Anatomy)	10.00

There is no Diploma Fee and no Fee for Graduation.

For further information, address

J. A. FOLLETT, M.D., Dean, 85 Water St., Boston, Mass.

ATLANTA DENTAL COLLEGE.

A SCHOOL OF DENTISTRY
BY DENTISTS
FOR DENTISTS.

FACULTY.

WM. CRENSHAW, D.D.S.,
Professor of Operative Dentistry and Dental Pathology.

H. R. JEWETT, D.D.S.,
Professor of Prosthetic Dentistry and Metallurgy.

R. E. HINMAN, M.D.,
Professor of Anatomy and Embryology.

J. A. CHAPPLE, D.D.S.,
Professor of Oral Surgery and Dental Hygiene.

THOS. CRENSHAW, D.D.S.,
Professor of Dental Therapeutics and Materia Medica.

THOS. P. HINMAN, D.D.S.,
Professor of Dental Histology, General Pathology, and Orthodontia.

O. H. McDONALD, D.D.S.,
Professor of Physiology.

DUDLEY YOUNGBLOOD,
Professor of Chemistry.

The Atlanta Dental College "is strictly a school of dentistry, its faculty are dentists, its building devoted to dental educational purposes. It has no connection with a medical college, and is not dependent upon medical college teachers."

Atlanta is situated on the rolling hills of the Piedmont range, east of the Blue Ridge, 1100 feet above the sea, and enjoys all the advantages of a semi-tropical winter climate, with none of the disadvantages of low-lying and moist atmospheric conditions incident to the same latitude elsewhere.

The regular winter session begins Tuesday, October 5, 1897, and closes six months later.

The registration of students for Session 1897–98 closes on October 15, 1897.

For further particulars, address

WM. CRENSHAW, Dean,
Grant Building, Atlanta, Ga.

PHILADELPHIA DENTAL COLLEGE

AND HOSPITAL OF ORAL SURGERY.

Eighteenth and Cherry Streets.

Removed to New Building, 18th and Buttonwood Streets.

ANNOUNCEMENT.

The College Year begins with the Spring Session, April 15, which session continues until the last day of May. The Winter Course commences October 1, and closes early in the ensuing April. **A preliminary Fall Course opens September 1.**

The Dispensary and Laboratory are open all the year, except during July and August. Instruction in PRACTICAL DENTISTRY is a prominent feature of the institution. This work is under the supervision of an executive committee composed of the practicing dentists of the school, the members of which, aided by competent Demonstrators, give special attention to the interests of students. The Dispensary consists of large, well-lighted rooms, furnished with comfortable operating-chairs, tables, and all conveniences, so that the opportunities here presented for acquiring a knowledge of clinical dentistry are ample and complete. The new laboratory is the largest of its kind in the country. A clinic in ORAL SURGERY is held every Saturday at 12 M.

Graduation.—Attendance on three courses of Lectures and satisfactory examinations in theory and practice are required for graduation. Graduates in medicine and pharmacy are eligible for graduation in Dentistry after attendance on Lectures and Clinical Service during two courses. These are excused from examination on subjects previously passed.

Fees.—Tickets for each course, including the Demonstrator's, $100; Matriculation, inclusive of Syllabi for home study, $5 for each course; Examination and Diploma Fee, $35. Board, $4 to $6 per week.

Special Clinics, for the study and treatment of Diseases of the Teeth, are held twice weekly by Profs. STELLWAGEN and GREENBAUM, and on Crown- and Bridge-Work Wednesdays and Saturdays at 8 A.M., by Prof. GUILFORD.

Special Lectures on Oral Surgery are given Monday Evenings at 8 o'clock, by Prof. BŒNNING.

Examinations. FIRST YEAR.—Progress in Anatomy, Physiology, Materia Medica and Anesthesia, Histology, and Bacteriology. SECOND YEAR.—Progress in Chemistry, Prosthetic and Operative Dentistry, Pathology and Therapeutics, and final in Anatomy, Physiology, Materia Medica and Anesthesia, Histology, and Bacteriology. THIRD YEAR.—Final in Chemistry and Metallurgy, Prosthetic and Operative Dentistry, and Dental Pathology and Therapeutics.

Graduation in Medicine.—Graduates in dentistry desiring to take the Medical degree continue their studies in a Medical College for two additional years.

Practical Requirements. FIRST YEAR. Technical course of tooth-study, including macroscopic anatomy, section-cutting, silhouette printing, free-hand drawing, and root-canal treatment and filling. Manipulation of dental materials. Making of experimental vulcanite and metal plates, and altering and repairing of same. Making denture on metal with vulcanite attachment. SECOND YEAR. Preparation and filling of at least twenty-four cavities in extracted teeth. Preparation of roots and making and mounting of six dowel crowns, three metal crowns and jackets, a piece of bridge-work, and general plate-work for patients. Also operative practice on patients and making of depositing plate. Dissection and chemical laboratory work. THIRD YEAR. Making of practical metal denture, requisite graduation fillings, chemical laboratory work, preparation of alloys, and general infirmary practice.

BOARD OF TRUSTEES.

President, GEN. JAMES A. BEAVER, LL.D., Ex-Governor of Pennsylvania.
Vice-President, Rev. HENRY C. McCOOK, D.D.
Secretary, CHAS. P. TURNER, M.D.

FACULTY.

HENRY MORTON, A.M., PH.D., Emeritus Professor of Chemistry.

S. H. GUILFORD, D.D.S., PH.D., Professor of Operative and Prosthetic Dentistry.
S. B. HOWELL, M.D., D.D.S., Professor of Chemistry and Materia Medica.
THOMAS C. STELLWAGEN, M.D., D.D.S., Professor of Physiology.
LEOPOLD GREENBAUM, M.D., D.D.S., Professor of Materia Medica, Anesthesia, and Odontotechny.
HENRY C. BŒNNING, M.D., Professor of Anatomy and General and Oral Surgery.

HENRY H. BURCHARD, M.D., D.D.S., Special Lecturer on Dental Pathology and Therapeutics.

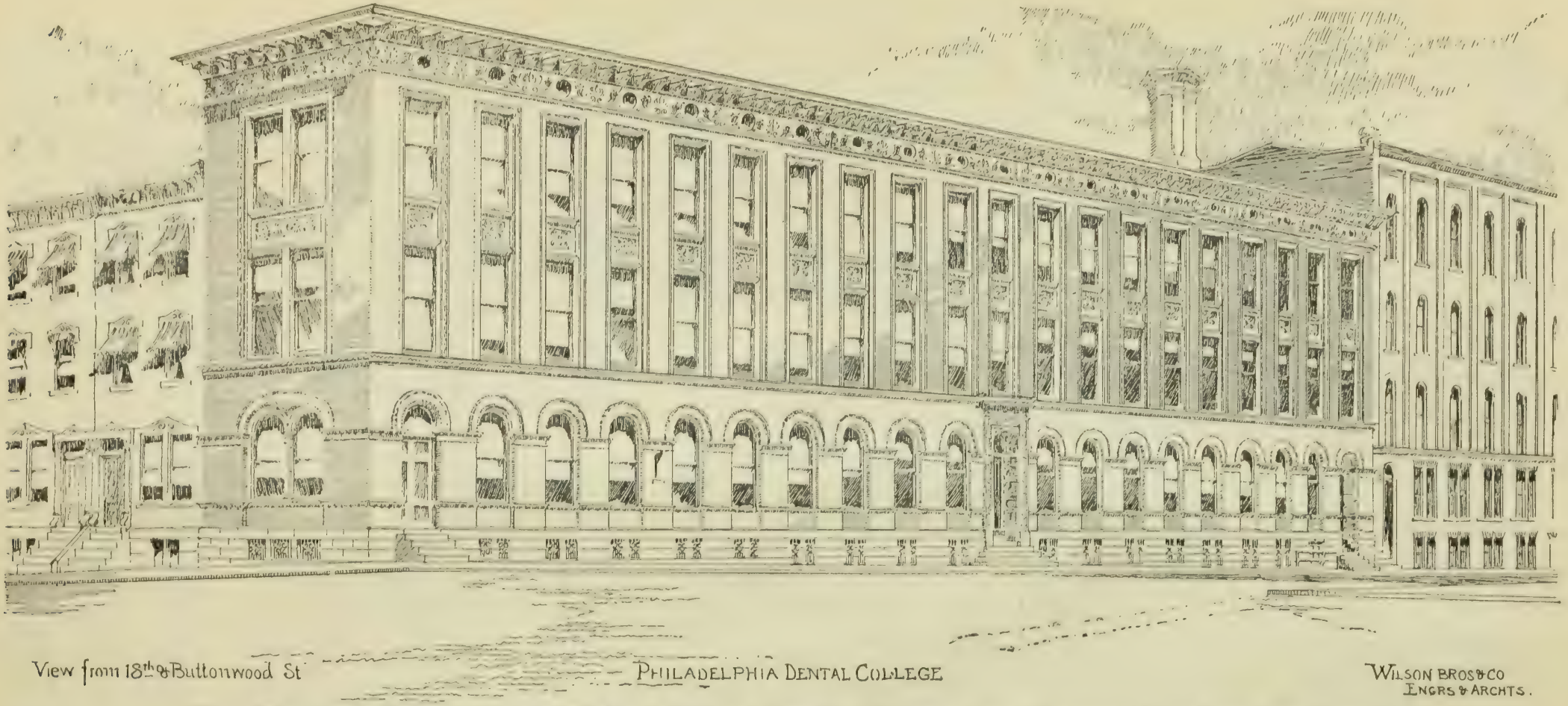
Demonstrators.

J. O. ROTHWELL, D.D.S., Practice of Dentistry.
OTTO E. INGLIS, D.D.S., Operative Dentistry and Dental Therapeutics.
J. W. MOFFITT, D.D.S., Prosthetic Dentistry, Block and Continuous-Gum Work.
G. C. CARDWELL, D.D.S., Prosthetic Dentistry.
GEORGE A. MAGEE, D.D.S., Operative Dentistry.
THOS. J. McLERNON, D.D.S., Operative Dentistry.
W. H. DOLMAN, D.D.S., Orthodontia and Crown- and Bridge-Work.
W. HALLOWAY, D.D.S., Crown-and Bridge-Work.
H. H. BOOM, M.D., Analytical Chemistry.
W. WALLACE FRITZ, M.D., Anatomy.
H. AUGUSTUS BACON, M.D., Histology and Bacteriology.
T. C. STELLWAGEN, JR., D.D.S., Assistant in Clinical Service.
ISIDORE LETT, D.D.S., Assistant in Clinical Service.
J. H. TORRANCE, Technics.

Clinical Instructors.

James McManus, D.D.S.	S. Eldred Gilbert, D.D.S.	Wm. N. Daniels, D.D.S.
W. G. A. Bonwill, D.D.S.	W. J. Magill, D.D.S.	Jas. R. F. Fitzpatrick, D.D.S.
C. E. Francis, D.D.S.	H. C. Register, M.D., D.D.S.	Hayes A. Clement, D.D.S.
F. D. Gardiner, D.D.S.	Joseph P. Wyman, D.D.S.	Howard E. Roberts, D.D.S.
Franklin Barnard, D.D.S.	S. B. Luckie, D.D.S.	R. L. Davis, D.D.S.
D. N. McQuillen, D.D.S.	Jos. R. C. Ward, D.D.S.	

DR. S. H. GUILFORD, Dean of the Faculty, 1728 Chestnut St., Phila., Pa.



The New Buildings of the Philadelphia Dental College and Hospital of Oral Surgery,

AT 18th AND BUTTONWOOD STREETS.

North Front of 200 feet on Buttonwood Street, extending 179 feet to Hamilton Street. Three Stories in height on Buttonwood and Five Stories on Hamilton Street.

There is a large lecture-room for 482 and an amphitheater for 606 students. The basement contains chemical laboratory, recitation rooms, tank and embalming rooms, boiler and engine rooms, storage for bicycles, etc. The first floor comprises offices, museum, hospital, assembly room, etc. The second floor is devoted to dental operating rooms, with a frontage of 200 feet facing north, and an extension at right angles of 179 feet, giving an exposure of 379 feet to the most desirable light for dental operations. The third floor is the same as the second, and is devoted to the dental laboratories. The fourth floor back contains dissecting room, special lavatories, etc.

UNIVERSITY OF MARYLAND.

DENTAL DEPARTMENT.

N. E. COR. LOMBARD AND GREENE STREETS, BALTIMORE, MD.

Hon. SEVERN TEACKLE WALLIS, LL.D., Provost.

FACULTY.

FERDINAND J. S. GORGAS, M.D., D.D.S., Professor of Principles of Dental Science, Surgery, and Mechanism.
JAMES H. HARRIS, M.D., D.D.S., Professor of Operative and Clinical Dentistry.
FRANCIS T. MILES, M.D., Professor of Physiology.
L. McLANE TIFFANY, M.D., Clinical Professor of Oral Surgery.
RANDOLPH WINSLOW, M.D., Professor of Anatomy.
R. DORSEY COALE, PH.D., Professor of Chemistry and Metallurgy.
I. EDMONDSON ATKINSON, M.D., Professor of Materia Medica and Therapeutics.
JOHN C. UHLER, M.D., D.D.S., Demonstrator of Mechanical Dentistry.
ISAAC H. DAVIS, M.D., D.D.S., Demonstrator of Operative Dentistry.
I. HOLMES SMITH, M.D., RIDGELY B. WARFIELD, M.D., } Demonstrators of Anatomy.

The Principal Demonstrators are assisted by sixteen Assistant Demonstrators. Special Instructions are given in Continuous-Gum and Bridge-Work.

At stated times during the Annual Sessions a number of prominent dental practitioners will hold Clinics and deliver Clinical Lectures.

Each year since its organization has added to the reputation and prosperity of this University Dental School, until now its graduates, in almost every part of the civilized world, are meeting with the success that ability will ever command. The past session was the most successful one in number of matriculates ever held; and visiting dentists from all parts of this country have expressed themselves as being astonished and gratified at the ability shown by the students when operating upon patients in the infirmary. Forming one of the departments of ONE OF THE OLDEST UNIVERSITIES in this country, its diploma is everywhere recognized and honored.

The instruction in both operative and mechanical dentistry is as thorough as it is possible to make it, and embraces everything pertaining to dental art. The advantages which the general and oral surgical clinics, to which the dental students are admitted, as indeed to all the lectures of the University, afford, cannot be overestimated. The many thousands of patients annually treated in the University Hospital, well known to be the largest Hospital in Baltimore, afford an abundance of material for dental infirmary and laboratory practice, and the oral surgery clinics.

The Infirmary and Laboratory practice for students is exceptionally large, a fact that adds so greatly to the facilities of this Dental School.

The Dental Infirmary and Laboratory Building is one of the largest and most complete structures of the kind in the world. The Infirmary is lighted by forty-seven large windows, and is furnished with the most improved operating chairs. It has again become necessary to enlarge the Dental Building, making an Infirmary nearly one hundred feet long, and a Laboratory eighty feet long and forty-three feet wide.

The Dental Infirmary and Laboratory are open daily (except Sundays) during the entire year for the reception of patients; and THE PRACTICE OF DENTAL STUDENTS has increased to such an extent that all the students during the past season have had an abundance of practical work in both operative and prosthetic dentistry. This means for practical instruction has already assumed such large proportions that the supply has been beyond the needs of the large classes in attendance during the past sessions. The exceedingly large number of patients for the extraction of teeth affords ample facilities for practical experience to every student.

In addition to the facilities afforded by this institution for a thorough course of instruction in the theory and practice of dentistry, the clinics in the University Hospital enable the Dental equally with the Medical Students to become familiar with the diseases and operations of Practical Surgery. Excisions of jaw, partial or entire; tumors, cancerous or benign, of various parts of the buccal cavity; plastic operations for restoration of cheek, lips, etc., may be mentioned as having been before the class during the year. The induction of anesthesia by means of different agents—ether, chloroform, bromide of ethyl, nitrous oxide gas, all being used in the clinics—cannot fail to be of use to the student of Oral Surgery. Junior as well as Senior students are afforded every opportunity for practical instruction in both operative and mechanical dentistry.

The Lecture Halls in the University Buildings are large and well lighted; and every facility will be afforded for practical and theoretical dental instruction. Demonstrations in Anatomy, Physiology, and Pathology (for which an abundance of material is furnished free of charge) also form an important part of the regular course. The Dissecting Room is large, well ventilated and lighted, and the Demonstrator of Practical Anatomy passes much of his time in assisting the students and directing their labors. Dissecting Material is furnished in abundance, free of charge.

The Qualifications for Admission and Graduation are those adopted by the National Association of Dental Faculties and the State Dental Examining Boards. The Diplomas of this School are recognized by all State Dental Examining Boards.

Qualification for Graduation: The candidate must have attended three full courses of lectures of five months each in different years at the Regular or Winter Sessions in this institution. As equivalent to one of these, one course in any reputable dental college will be accepted. Graduates of medicine can enter the Junior Class. The matriculant must have a good English education; a diploma from a reputable literary institution, or other evidence of literary qualifications will be received instead of a preliminary examination. All students, both juniors and seniors, have equal advantage in operative and mechanical dentistry in this institution throughout every session.

Graduation in Medicine: Graduates of the Dental Department of the University of Maryland are required to attend but one session at the University School of Medicine prior to presenting themselves as candidates for the degree of "Doctor of Medicine." (See Catalogue.)

The Regular or Winter Session will begin on the 1st day of October, and will terminate in March of each year.

The Summer Session, for practical instruction, will commence in March, and continue until the Regular Session begins. Students in attendance on the Summer Session will have the advantages of all the daily Surgical and Medical Clinics of the University.

The fees for the Regular Session are $100, Demonstrators' fees included; Matriculation Fee, $5; Diploma Fee, for candidates for graduation, $30; Dissecting Ticket, $10.

For Summer Session, no charge to those who attend the following Winter Session.

Board can be obtained at from $3.50 to $5 per week, according to quality.

The University Prize and a number of other Prizes will be specified in the annual Catalogue.

Students desiring information and the annual Catalogue will be careful to give full address and direct their letters to

F. J. S. GORGAS, M.D., D.D.S.,

Dean of the Dental Department of the University of Maryland,

845 N. Eutaw Street, Baltimore, Md.

Michigan University Dental College.

ADMISSION EXAMINATIONS are held during the last week of June and September.

THE ANNUAL TERM begins October 1 and continues for nine months, closing the last week in June.

THE AVERAGE ANNUAL FEES for tuition and laboratory expenses will be about $65 for non-residents of Michigan.

THE ANNUAL ANNOUNCEMENT contains particulars and will be sent on request.

J. TAFT, Dean,
Ann Arbor, Mich.

Missouri Dental College.—St. Louis Medical College.

Departments of Washington University.

ST. LOUIS, MO.

Session begins September 28, 1897, and ends April 28, 1898. Our laboratories are well equipped and admirably adapted for the comfort and instruction of 400 students. Our Dental Infirmary offers unequaled opportunities for practical instruction. Our clinical facilities are of the best, and include out-clinics, private hospitals, and a full share of the work in the city institutions.

Many years' experience as schools of high standard have perfected the three years' graded course.

Apply at the College Building, 1806–1814 Locust St.

HENRY H. MUDD, M.D., Dean.
A. H. FULLER, M.D., Secretary.

Chicago College of Dental Surgery. Dental Department of Lake Forest University.

The Annual Winter Course of Instruction will begin about October 1, and end about April 1.

Three full winter courses of lectures are required before graduation. Graduates of pharmaceutical and undergraduates of medical colleges in good standing and graduates of reputable veterinary colleges are admitted to the second year course, and can become candidates for graduation after taking two full winter courses of instruction.

TOPICAL STATEMENT OF WORK.

FIRST YEAR.

During the Freshman year the studies taken up are: Theoretical and Practical Chemistry, Anatomy, Physiology, Materia Medica, Dental Anatomy, Histology, Operative and Prosthetic Technics, and Operative and Prosthetic Dentistry.

Recitations in this course are conducted daily in commodious rooms specially arranged for this method of teaching. Stated lessons assigned from approved text-books supplement the didactic lectures and work in the laboratories.

SECOND YEAR.

During the Junior year students complete the work in Anatomy, Physiology, Chemistry, Histology, Pathology and Bacteriology, and Materia Medica. In additio to this they receive instruction in Comparative Dental Anatomy, Crown- and Bridge-Work, Regulating Appliances, Splints, and all kinds of Plate Work, and operate in the Infirmary.

THIRD YEAR.

During the Senior year the students listen to lectures on Oral Surgery, Therapeutics, Operative Dentistry, Dental Anatomy and Pathology, Orthodontia, and attend Clinics. In addition to the lectures each student is required to operate in the Infirmary and perform practical work in the Laboratory.

Fees good until April 1, 1898.

FRESHMAN YEAR, 1897-98.

Matriculation fee	$5 00
General ticket	100.00
Histological laboratory ticket	5.00
Dissection fee (one part)	10.00
	$120.00

JUNIOR YEAR, 1897-98.

Matriculation fee	$5.00
General ticket	100.00
	$105.00

SENIOR YEAR, 1897-98.

Matriculation fee	$5.00
General ticket	100.00
	105.00

A fee of $5.00 must be deposited to cover chemicals and breakage in the Chemical Laboratory.

FEES FOR THE ANNUAL SPRING AND SUMMER COURSE.

Students will be admitted to this course upon payment of the matriculation fee and twenty dollars. Those who attend only one month will be required to pay the matriculation fee and ten dollars. The amount paid during the spring and summer course will be deducted from the fees of the following winter session.

The Practitioner's Course will consist entirely of practical work. Those who wish to may take up this work during the spring and summer months.

Instruments and appliances for clinical department will cost from $25.00 to $40.00.

Board, including light and fuel, can be obtained at a convenient distance from the college at from $2.50 to $4.00 per week.

Graduates of the College are requested to notify the Dean of changes in their residences.

Letters of inquiry should be addressed to

DR. TRUMAN W. BROPHY, Dean, 126 State Street, Chicago, Ill.

Chicago College of Dental Surgery

DENTAL DEPARTMENT OF LAKE FOREST UNIVERSITY.



COLLEGE BUILDING.
S. E. Cor. Wood and Harrison Sts.

The new college building occupies a prominent position among a group of fifteen others, comprising medical colleges, hospitals, and schools.

The lot on which the building stands has a frontage of eighty-five feet, and a depth of one hundred and twenty feet. It is a five-story and basement structure, the basement and first story being of rock-faced Bedford stone, and the superstructure of pressed brick and terra-cotta, with terra-cotta trimmings.

The building has two entrances, the main one through a large cut-stone doorway surmounted by a stone arch beautifully ornamented with carved work. The interior is finished in hard wood, according to the latest idea of elegance, convenience, and comfort.

The entire six floors of the building are divided into lecture rooms, class rooms, clinic rooms, etc., with the exception of the second floor, which is devoted to the Dental Infirmary. The chief lecture room has a seating capacity of four hundred and fifty students. There is also a dissecting room, thoroughly equipped with all the requisites for the study of human anatomy.

There are Histological, Chemical, Bacteriological Laboratories, also Laboratories for the study of Operative and Prosthetic Technics, and one for the construction of artificial dentures.

The building occupied by the Chicago College of Dental Surgery is, in all its appointments, one of the most perfect and complete of its kind.

Letters of inquiry should be addressed to

DR. TRUMAN W. BROPHY, Dean,
126 State Street, Chicago, Ill.

Harvard University, Dental Department.

BOSTON, MASS., 1897-98.

FACULTY.

CHARLES W. ELIOT, LL.D., President.
EUGENE H. SMITH, D.M.D., Dean, and Professor of Mechanical Dentistry and Orthodontia.
J. COLLINS WARREN, M.D., Professor of Surgery.
HENRY P. BOWDITCH, M.D., Professor of Physiology.
THOMAS DWIGHT, M.D., Professor of Anatomy.
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General Anatomy, Physiology, General Chemistry, Hygiene, Histology and Embryology, and Bacteriology, together with ample dissecting under able demonstrators, are the studies of the first year, and are identical with those of the Harvard Medical School. The studies for the second year are Operative and Mechanical Dentistry and Orthodontia, Crown- and Bridge-Work and Metallurgy, Materia Medica and Therapeutics, Oral Anatomy and Physiology, and Bacteriology, Dental Pathology, and Oral Surgery. Of the third year the studies are Operative and Mechanical Dentistry and Orthodontia, Crown- and Bridge-Work, and Metallurgy, Neurology and Surgical Pathology and Surgery. Attention is called to the fact that TWENTY-SEVEN MONTHS of progressive instruction compose the required three years in the school.

All applicants for advanced standing must pass the examination of the years they desire to omit, or furnish proof that they have passed EQUIVALENT examinations.

At the end of each year written and oral examinations test the student's knowledge, and he must pass satisfactorily in a majority of the studies of each year before he can pass on to the next year's class.

To those wishing to take the medical degree the studies taken in the first year of this school are allowed in the Medical School of the University, after passing the required entrance examinations.

The University Degree, D.M.D. (Dentariæ Medicinæ Doctor), is conferred upon all who fulfill the requirements.

Graduates of recognized dental schools will be admitted to the courses of Operative and Mechanical Dentistry on payment of $50 each, or $100 for both, for the whole or any portion of the academic year.

FEES.

There are no fees for matriculation, nor for the diploma, nor for the demonstrators. For the first year the student is a member of the school the fee is $200, payable in two instalments of $120 and $80; for the second year, $150, in two payments of $100 and $50; for the third year, $150, in two payments of $100 and $50. For any subsequent year, $50, payable at the beginning of the year. For information and announcements, address

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The 16th Session opens Monday, September 6, 1897, and closes May 31, 1898. No student can be admitted for this session later than September 16, 1897.

The preliminary examinations for entrance will be held at the College building, corner Market and Taylor Streets, August 30 and 31, at 9 A.M.

Examinations include English, Physics, Latin, and any two of the following: Chemistry, French, German, Algebra, Plain Geometry, Botany, Zoology.

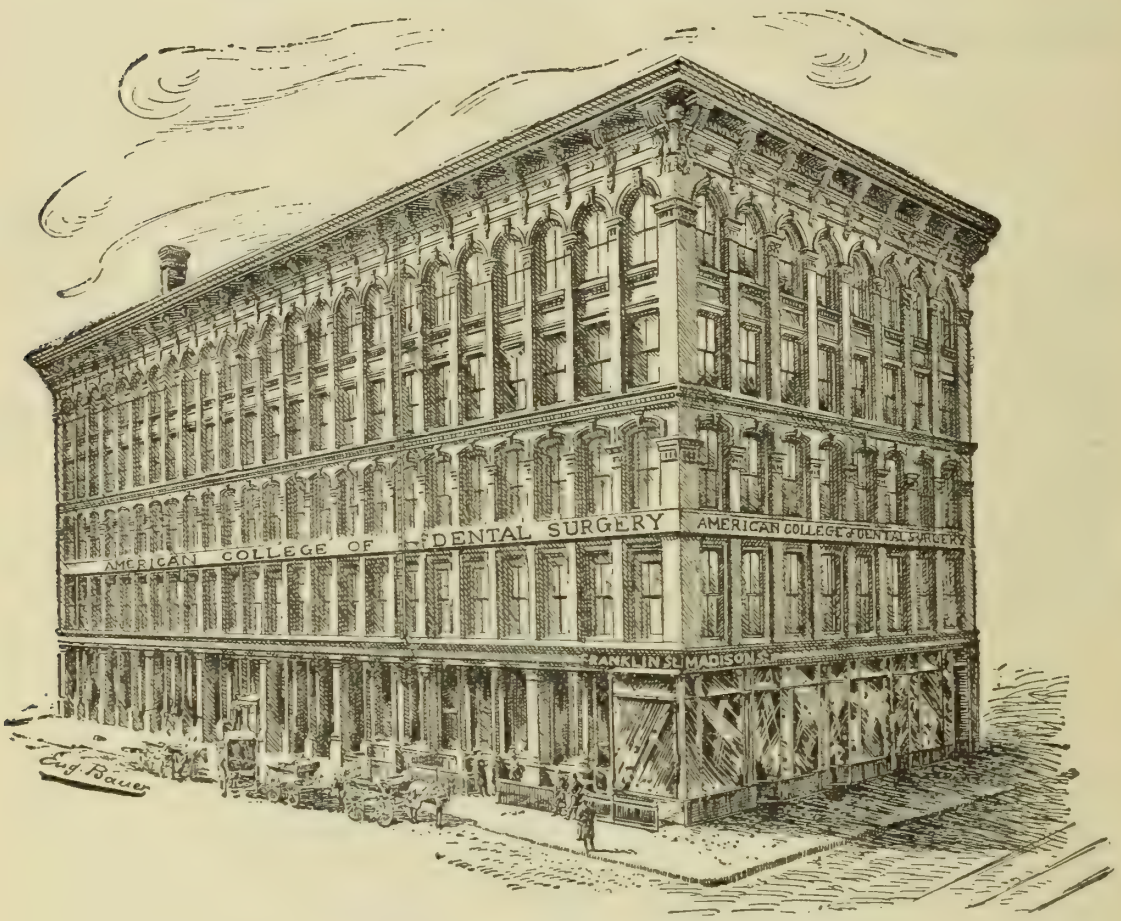
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The department will be so conducted as to teach dentistry both as a science and with special relation to medicine, thus embracing the two schools for the furtherance of a higher dental education. The new department will also be conducted in harmony with the requirements of the National Association of Dental Faculties.

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